DOCUMENT RESUME

ED 441 311 EC 307 878

AUTHOR Duschene, Ann Aranda
TITLE Teaching Functional Skills through Technology: Using Assistive Technology and Multimedia Tools To Develop Career Awareness for Students with Cognitive Disabilities.
PUB DATE 1998-00-00
NOTE 98p.; Master of Science Thesis, St. Norbert College.
PUB TYPE Dissertations/Theses - Masters Theses (042) -- Tests/Questionnaires (160)
EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Assistive Devices (for Disabled); *Career Awareness; *Career Education; Career Planning; *Computer Assisted Instruction; *Computer Uses in Education; Data Collection; Grade 5; Intermediate Grades; Interviews; Learner Controlled Instruction; *Learning Disabilities; *Mental Retardation; Outcomes of Education; Questionnaires

ABSTRACT

The benefits and effects of computers and other assistive technologies to develop career awareness for four fifth-grade students with cognitive disabilities were examined. The students participated in a seven-week career awareness exercise and used the following assistive technology and multimedia tools: Hyperstudio, Intellikeys, Co-Writer, ClarisWorks, Write-Outloud, Picture It, CD-ROM software, the Internet, a Macintosh computer, a camcorder, a Quick-Take, Polaroid, digital and 35mm cameras, and a television and VCR. Observations, field notes, self-designed questionnaires and formal interviews with students (with and without disabilities), parents, teachers, and a speech therapist were used to collect data. Outcomes reported included enhanced motivation to participate in and complete assigned work, an increase in communication skills, independence, knowledge of the world of work, and self-esteem. In addition, students had fun, were recognized by others for their capabilities, and were more likely to have their learning styles and preferences addressed by their parents and school staff. (Contains 81 references.) (Author/CR)

Reproductions supplied by EDRS are the best that can be made
from the original document.

EC

ED 441 311

Teaching Functional Skills Through Technology: Using Assistive Technology and Multimedia Tools to Develop Career Awareness for Students with Cognitive Disabilities

by

Ann Aranda Duschene

A thesis submitted in partial fulfillment
of the requirements for the degree

of

Master of Science

Adaptive Education

Approved:

Committee Chair

Committee Member

Committee Member

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
✓ This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Duschene

1

St. Norbert College
DePere, WI
1998

BEST COPY AVAILABLE

EC 307828

TABLE OF CONTENTS

	Page
CHAPTER 1	2
Statement of the Problem	4
Definition of Terms	5
Importance of the Study	7
Limitations	10
CHAPTER 2 - Review of the Literature	11
Multimedia Instruction	15
Technology and Significant Learning Challenges	17
Learning Styles of Students with Cognitive Disabilities	21
Developing Functional Skills - Career Awareness	27
CHAPTER 3 - Procedures	32
Methodology	32
Multimedia and Assistive Technology Use	32
Sample	35
Adam	36
David	36
Justin	37
Katie	37
CHAPTER 4 - Results	39
Analysis of Multimedia and Assistive Technology	39
Adam	39
David	41
Justin	42
Katie	44

TABLE OF CONTENTS

	Page
Analysis of Parent Data	46
Analysis of Student Data	47
Analysis of Teacher Data	49
Analysis of Regular Education Student Data	50
Summary	52
CHAPTER 5 - Conclusion	53
Discussion of the Findings	54
Implications	55
References	57
Appendix A: David's Interview Questions Using Picture It	66
Appendix B: Justin's Interview Questions	67
Appendix C: Student Questionnaire	68
Appendix D: General Education Teacher Questionnaire	70
Appendix E: Regular Education Student Questionnaire	72
Appendix F: Speech and Language Teacher Questionnaire	74
Appendix G: Parent Interview Questions about Technology Use	76
Appendix H: Questionnaire and Interview Instrument Review Panel	77
Appendix I: HyperStudio Hard Copy	78
Appendix J: Parent Permission Letter	91
Appendix K: Principal Permission Letter	93

LIST OF TABLES

	Page
Table 1	9
Table 2	48
Table 3	51

Abstract

The benefits and effects of computer and other assistive technology to develop career awareness for four fifth grade students with cognitive disabilities were examined. The students participated in a seven week career awareness exercise and used the following assistive technology and multimedia tools: Hyperstudio, Intellikeys, Co-Writer, ClarisWorks, Write-Outloud, Picture It, CD-ROM software, the Internet, a Macintosh computer, a camcorder, a Quick-Take, Polaroid, digital and 35mm cameras, and a television and VCR. Observations, field notes, self-designed questionnaires and formal interviews with students (with and without disabilities), parents, teachers, and a speech therapist were used to collect data. Outcomes reported included, but were not limited to, enhanced motivation to participate in and complete assigned work, an increase in communication skills, independence, knowledge of the world of work, and self-esteem. In addition, students had fun, were recognized by others for their capabilities, and were more likely to have their learning styles and preferences addressed by their parents and school staff.

Teaching Functional Skills Through Technology: Using Assistive Technology and Multimedia Tools to Develop Career Awareness for Students with Cognitive Disabilities

Chapter 1

Stephen Hawking, a staff member at Cambridge University, is perhaps the best known modern physicist since Einstein. At the age of twenty-one he was diagnosed with ALS, a degenerative nerve disease. With the use of a voice synthesizer and other computer technology, he has been able to communicate his genius to the world.

Misty is a young lady with Down syndrome who, as a child, had little control over things in her life. When she was just six years old, she visited a friend who was born with cerebral palsy. Her friend used a motorized wheel chair, a computer, and various devices and switches to communicate. Misty was amazed at all she saw her friend do and the power he possessed. Shortly after her first encounter with technology her parents bought her a computer. Misty learned the keyboard quickly. She was able to demonstrate her interests and abilities using the computer at school to her regular education teacher. It became clear to her teacher Misty could be included in activities using the computer, just like everyone else.

Stephen and Misty can be an inspiration to all of us, especially to people with disabilities. Ten years ago, technology was unavailable to most students with disabilities. Today, technology impacts the lives of everyone with applications ranging from NASA to Nintendo (Wisconsin

Department of Public Instruction's Assistive Technology Initiative, 1995). Technology can help people with mental retardation overcome barriers towards independence and integration as it compensates for the functional limitations of the user and serves as a liberating agent for the individual (The ARC, 1993). Copel (1991) affirms the user may communicate with others, engage in recreational and social activities, learn, work, control the environment, and increase his or her independence in daily living skills with the assistance of technology.

"Goals 2000: Educate America Act" and the "School to Work Opportunities Act of 1994" encourage educators to be more accountable in preparing all students for the future. Educators must become advocates for each child with special needs and stress "hands-on" life skill mastery, using a life skills curriculum approach. Students with mental retardation clearly need an emphasis in developing life skills (Smith, Price, & Marsh, 1986). This type of approach blends academic, daily living, personal/social, and occupational skills into integrated lessons designed to help students learn to function independently in society.

Stephen and Misty, like many other individuals with disabilities, are using technology to demonstrate their competencies and enhance their independence, productivity, and integration into their communities. For most students with cognitive disabilities, traditional reading and writing assignments present significant challenges. Technology holds exciting possibilities for enhancing self-esteem and quality of life for students with cognitive disabilities. In addition, the use of assistive technology provides a promising means to compensate for barriers to independence,

self-determination, and integration experienced by people with mental retardation (Wehmeyer, 1996). Multimedia instruction enables these students to actively and meaningfully participate in curricular activities that will prepare them for adult life.

Statement of the Problem

The learning styles of students with cognitive disabilities can be addressed through use of assistive technology and multimedia tools. Students with cognitive disabilities need to develop functional knowledge, skills and behaviors in order to assume valued roles in the community. Career awareness is a functional skill that needs to be addressed as early as elementary level for students with cognitive disabilities. Recent developments in technology make it possible to integrate images, sounds and text in multimedia computer environments, thereby providing a multimedia approach which can be effective with students who have significant challenges with communication and learning. For students with cognitive disabilities, technology provides opportunities for learning, creativity, choice, empowerment, independence, a means of expression, and enjoyment.

At present, too many educators continue to use traditional approaches with a nonfunctional curriculum when working with students with cognitive disabilities. The learning styles of students with cognitive disabilities are not routinely being addressed. Certain knowledge, skills, and behaviors that are being taught to students with cognitive disabilities are not functional. Career awareness is not routinely being taught at the elementary level to students with cognitive disabilities. Use of assistive technology and multimedia tools can meet the strengths, preferences, and

learning styles of students with cognitive disabilities, thereby reinforcing functional knowledge, skills, and behaviors needed to be valued members of the community. Assistive technology and multimedia tools can be used to develop career awareness activities with fifth grade students who have cognitive disabilities.

Definition of Terms

Career Awareness. Activities at the elementary level which are designed to make students aware of the broad range of careers and/or occupations in the world of work.

Communication Skills. Expressing one's self through oral language, written words, pictures, sign language, or augmentative communication (i.e. electronic devices).

Functional Skills. Skills that are used by individuals on a routine basis to accomplish daily living tasks.

Goals 2000: Educate America Act. A law passed that is helping all Americans to reach internationally competitive standards through educational reform.

Individual Education Program (IEP). A written statement for each student with a disability that is developed annually by parents, educators, and the student (when appropriate), which states measurable annual goals and short-term objectives, related services, and supplementary aids related to meeting the student's needs and the environment in which the student will participate (U.S. House of Representatives, 1997).

I.D.E.A. The Individuals with Disabilities Education Act of 1990, formerly the Education of all Handicapped Children's Act (EHA). This special education law was modified with the addition of the Technology Related Assistance for Individuals with Disabilities Act in addition to other changes (Lusk, 1994).

Inclusive Setting. Participation in the regular educational environment whereby the student receives instruction by a regular education teacher.

Mental Retardation. Refers to "substantial limitations in present functioning. It is characterized by: significantly subaverage intellectual functioning, existing concurrently with related limitations in two or more of the following applicable adaptive skill areas: communication, self-care, home living, social skills, community use, self-direction, health and safety, functional academics, leisure, and work. Mental retardation manifests before age 18" (American Association on Mental Retardation, 1992, p.2).

Mild Cognitive Disability. Refers to significantly subaverage general intellectual functioning concurrently with deficiencies in adaptive behavior manifested during the developmental period. The measured intelligence is to be found at 2 Standard Deviations below the mean. Wisconsin law prohibits the use of the term mental retardation in the public schools.

Moderate Cognitive Disability. Refers to significantly subaverage general intellectual functioning concurrently with deficiencies in adaptive behavior manifested during the developmental period. The measured intelligence is to be found at 3 Standard Deviations below the mean.

Multimedia. Refers to the use of computers, interactive software, video cameras, CD-ROM discs, laser discs, cameras, tape recorders, and the Internet to be used as tools for learning.

Regular Educational Environments. The classroom environment whereby the student is given instruction following the general curriculum.

School to Work Opportunities Act of 1994. "The school-based component of a School-to-Work Opportunities program shall include . . . career awareness and career exploration and counseling in order to help students who may be interested to identify and select or reconsider, their interests, goals, and career majors" (Lester and Perry, 1997, p. 2).

Section 504 of the Rehabilitation Act. A federal civil rights law passed in 1973 to insure that students with disabilities receive a free appropriate public education (FAPE) and to protect individuals with disabilities from discrimination (Lusk, 1994).

Importance of Study

There is significant research to demonstrate that multimedia tools and assistive technology can address the learning styles of students with cognitive disabilities. Literature also supports the need of students with cognitive disabilities to develop functional knowledge, skills and behaviors in order to assume valued roles in society. There is significant research so show the need for career education at all grade levels and career awareness activities to begin at the elementary level. The literature indicates career education is the key area in the educational programming of students with cognitive disabilities. Very little is known, however, about the use of multimedia tools to develop functional skills, more

specifically career awareness activities, with students with cognitive disabilities.

The intent of this study is to make fifth grade students with cognitive disabilities aware of the broad range of careers and/or occupations in the world of work. By beginning career education at this early level, positive work values are developed that can affect the school drop-out rate, unemployment, multigenerational welfare cycles, and crime. Career awareness activities can give hope to students who struggle academically and give them a reason to stay in school. For students with cognitive disabilities, career awareness activities help prepare them to set goals and make appropriate vocational choices. It gives them the message from the beginning that they do possess the potential to work, live, and be successful in the community.

This study will describe and analyze the use of multimedia tools and assistive technology to develop career awareness activities with four fifth grade students who have cognitive disabilities. Students will use the Internet and CD-ROM software to explore career interests. Students will also explore their interests by visiting various job sites in the community and seek information regarding jobs and the skills needed to do them. A naturalistic inquiry, incorporating qualitative data, will be used to investigate this phenomena. Data collection procedures will include observations, videotapes of children as they use assistive technology and multimedia tools, self designed questionnaires, and formal interviews with teachers, students, and parents. Table 1 displays other relevant equipment to be used in this study.

Table 1

Equipment to be Used in the Study

Multimedia tools	Software
Macintosh Computer	Claris Works 4.0
Camcorder	CoWriter
Quick Take camera	Children's Occupation Outlook CD-ROM
Polaroid camera	Write-OutLoud
Color scanner	Picture It
Intellikeys	Board Maker
Tape recorder	KidsPix 2
35mm camera	Groliers Encyclopedia CD-ROM
Digital camera	HyperStudio
Television	Career-O-Rama CD-ROM
Video recorder	Netscape 3.0 (Internet)
Zip Drive	

Limitations

Limitations of the study include the terminology used in the literature varying from source to source. Career education, vocational education, occupational skills, career development, and school-to-work are interchangeable referring to the same topic. The same is true for the terms mental retardation, cognitive disabilities, mentally handicapped, and/or cognitively challenged. It is the intent of this study to focus on preparing students for the world of work.

Chapter 2

Review of Literature

In 1988, P.L 100-407, the Technology-Related Assistance for Individuals with Disabilities Act was signed into law. The purpose of this law was to provide financial assistance to the states to enable them to conduct needs assessments, identify technology resources, provide assistive technology services, and conduct public awareness programs (Blackhurst, 1997). This law also provided a definition of assistive technology. The term assistive technology refers to "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities" (Todis and Walker,1993, p.4).

In the Findings and Purpose section of the Technology-Related Assistance for Individuals with Disabilities Act of 1988, Congress stated the provision of assistive technology devices and services to individuals with disabilities enables individuals to:

> (A) have greater control over their own lives, (B) participate in and contribute more fully to activities in their home, school and work environments, and in their communities, (C) interact to a greater extent with non-disabled individuals, and (D) otherwise benefit from opportunities that are taken for granted by individuals who do not have disabilities (p. 1044).

Blackhurst (1997) suggests we view technology as a tool that can be used to solve problems in the education of students. Solutions should be in a continuum ranging from "high-tech" to "no-tech." Some solutions

may include the use of sophisticated devices such as multimedia computer systems, to less complicated electronic devices such as audiocassette players. Some solutions require no devices or equipment and may involve the use of alternative teaching procedures.

Technology is often referred to as tools in education. Cavalier, Ferretti and Okolo (1994) describe the use of technology as a cognitive prosthesis and as a cognitive scaffold. They explain that as a prosthesis, technology can provide a function or ability that would otherwise be absent or impaired for an individual. As a scaffold, technology can provide temporary support for individuals as they master a new skill.

Technology plays a vital role in all of our lives. For persons with cognitive disabilities, the promise of technology is particularly well-recognized. There is extensive research that demonstrates technology playing a critical role in the facilitation of optimal participation in our society. Hadley (1992), gives the example:

> Tasks as simple as ordering a hamburger at McDonald's were formerly impossible for many persons who are non-verbal and have mental retardation. Now, using an electronic communication board that responds verbally to picture codes selected and entered by its operator, they can order whatever they choose. (p. 16)

Even for young children with cognitive disabilities, devices can become naturally assimilated as a part of our environment (Parette, 1991). By having an early awareness of what is possible, young children can broaden their own aspirations, as well as the expectations of others, regarding their potential. With such early experiences, it is anticipated

that as adults, these individuals will become capable of achieving the goal of optimum functioning.

Technology applications tend to strengthen children's communication both as a tool for communication and as a topic of communication (Hutinger, 1994). When used with a speech synthesizer, a computer provides a voice for communication or for language simulation activities. Combined with graphics and animation, the added component of speech output is an important contributor to communication development (Meyers, 1986, 1990: Shane & Anastasio, 1989).

In addition, computer use promotes gains in emotional and social development. As a child successfully uses computer applications and becomes increasingly competent, feelings of self-confidence and self-esteem result and the child gains a sense of autonomy (Barnes & Hill, 1983; Brady & Hill, 1984: Swigger & Swigger, 1984). The computer is also a tool for enhancing social interaction and cooperation (Clements & Hastasi, 1985: Mulhstein & Croft, 1986: Muller & Perlmutter, 1985). Computers have the potential to equalize play opportunities and allow children with disabilities to participate with their non-disabled peers (McCormick, 1987) while various software programs can be used to promote turn-taking, group interaction, and problem-solving (Church & Glennon, 1992). Spiegel-McGill, Zippiroli, and Mistrett (1989) found positive results when children with significant social interaction deficits and speech and language delays played on a computer with socially competent peers who did not have disabilities. Clements (1987) proclaims, computers encourage as well as benefit both social and cognitive interactions.

Technology use for children with multiple disabilities tends to be used to remedy impairments and to assist individuals learn and/or perform tasks (Garner & Campbell, 1987). It provides learning situations in which the children manipulate their environments and develop understanding of their abilities to control these environments (Brinker & Lewis, 1982: Parette & Van Biervliet, 1991), communication (Traynor & Beukelman, 1984), mobility (Butler, 1988; Holder-Brown & Parette, 1992), and age appropriate living skills (Esposito & Campell, 1987). Of all the skills developed through the use of technology, understanding the relationship between behavior and manipulation of the environment is a skill which is critical for all future learning (Schweigert, 1989) .

In a proposal to improve academic outcomes, Congress recently passed the Reauthorization of the Individuals with Disabilities Education Act (IDEA) which President Clinton signed June 4, 1997 (Quality Education Coalition, 1997). The new law reaffirms the right to a free, appropriate public education (FAPE) to students with disabilities. Further, Section 504 of the Rehabilitation Act provides an additional tool for assuring that school-age children with special educational needs receive free appropriate education. "Under Section 504, assistive technology and other special instruction, related services and aids may support a person in learning, communicating or otherwise participating in their educational program" (Lusk, 1994 p. 6). In addition, these new laws impose new requirements on states and schools (Special Education Report, 1997). This new law adds a list of requirements for Individualized Education Programs (IEPs) which include the use of assistive technology. "The IEP team must consider whether the child requires assistive technology devices

and services" (Kahl, 1997, p. 15). Parents, educators and advocates must become familiar with the "new" IDEA so all can be active participants in making it work for children (Quality Education Coalition, 1997).

Some very noteworthy technological advances have been made in recent years which make life easier for the members of our society who have physical and mental handicaps (Hadly, 1992). Recognizing and including technological devices in the daily lives of the these individuals needs to be closely considered and implemented. This is accomplished through the IEP. Blackhurst states "as part of the IEP planning process, parents, teachers, and administrators are required to consider technologies that may help a child meet the IEP objectives" (1997, p. 45). Parette (1997) proclaims, "greater collaboration be encouraged between persons with mental retardation and developmental disabilities, family members, and professionals to examine and document perceptions and impact of assistive technology devices and services" (p. 9). We can all "make it work for children" by becoming knowledgeable of the new laws and the latest in assistive technology.

Multimedia Instruction. Recent developments in technology make it possible to create multimedia computer environments including text, graphics, images, audio, video, and tools for manipulating and transforming these symbol systems. Agnew, Kellerman, and Meyer (1996) state that students create multimedia projects to learn academic subjects and other life-long skills. The purpose of using multimedia projects is to help the creators achieve academic goals. It gives students opportunities to organize what they have learned and express information.

activities can be a vehicle for self-expression in all environments. Holzberg (1994, p.19) states, "paper and pencil does not always give an indication of a student's creativity, but the computer will."

Computers are tools to foster self-expression, as described by Holzberg (1994). When looking at a group of youngsters with behavioral and emotional challenges who also had a history of severe academic underachievement, Holzberg (1994) found that with the use of computers and software, students' writing improved significantly. "Technology helps students with disabilities uncover and release an intellectual potential that has been buried under layers of frustration and emotional conflict" (Holzberg, 1994, p. 20). Students feel smart, do not feel degraded or inferior, because computers do not have a preconceived bias about what kids can or cannot do. Computers also have tremendous patience and just keep coming up with helpful suggestions.

In intervention studies aimed at developing literacy in individuals with cognitive disabilities (Katims, 1991; Raver & Dwyer, 1986), physical and sensory impairments (Decoste, 1993; Rogow, 1982; Wasson & Keeler, 1984), and communication disorders (Erickson & Koppenhaver, 1995; Steelman, Pierce, Alger, Shannon, Koppenhaver, & Yoder, 1992), subjects have been capable of gaining some degree of literacy skills. Giving persons with disabilities access to literacy systems (i.e. printed input and a way to create written output) appears to develop face-to-face and/or written language abilities (Koppenhaver, Pierce, Steelman, & Yoder, 1995).

"The ability to read and write was seen as nonfunctional, or too abstract, for persons with severe or multiple impairments until literacy and

the process of becoming literate were redefined on the basis of research with persons with and without disabilities" (Koppenhaver, Coleman, Piecre, Kalman, & Yoder, 1991, p. 1). Current thinking on both the product and process of literacy embraces the concepts of emergent literacy and a more encompassing definition of communication (Pierce & Porter, 1996).

Pierce and Porter (1996) explain:

> Literacy in its emergent form, that is understanding that one can gain and give information, enjoyment, and desired ends through the print of logos and trademarks, environmental items, and through print and pictures in storybooks and other media, should be considered a variable means of communication for persons with any type or configuration of impairments. Adults do not stop talking to children who are hearing impaired, so why should they not read with or offer writing opportunities to persons who demonstrate sensory, cognitive, and/or physical impairments? (p. 2)

All persons must be given access and opportunity to communicate via all four modes of communication: listening, speaking, reading, and writing. "Literacy is currently seen as a constructive social process in which persons gain and give meaning from print on the basis of background knowledge of the world and their other communication skills" (Passas, Kiefer, & Levstik, 1990, p. 1). Prerequisites to literacy no longer exist. Learning is an active process and all persons learn by doing.

Service providers need to include children with developmental disabilities in more typical early literacy activities (Koppenhaver et al.,

1991). As previously mentioned, several studies indicate that inclusion in emergent literacy activities such as participation in predictable story reading and daily functional writing activities leads to beneficial results in both oral and written language development with persons with a wide range of disabilities (Decoste, 1993; Katims, 1991; Steelman, Pierce, Alger, Shannon, Koppenhaver, & Yoder, 1993).

Pierce and Porter (1996) conclude, in order for persons with disabilities to develop total communication abilities, they must be enabled to more successfully participate in mainstream educational, vocational, and leisure settings. It is therefore necessary for persons with cognitive disabilities to receive total communication programming which is rich in both oral and written language input and opportunities for useful, functional, and enjoyable written language output. The use of assistive technology and multimedia tools to help individuals with more severe disabilities to develop and practice literacy is often necessary.

For students with cognitive disabilities and others who have serious learning challenges, success and progress may be slow because much of their instruction is centered around their weaknesses rather than capitalizing on their strengths, preferences, and cultures (Daiute and Morse, 1996). In a case study by Daiute and Morse (1994), three children with serious writing problems were able to adapt the multimedia context making it flexible to their own strengths and needs. Children use images to improve their comprehension and production of text. Images and sounds can be useful tools for bringing children's experiences into the classroom. These children have much to share and want to be heard and valued. "Computers sometimes provide the only means a person with a

1991). As previously mentioned, several studies indicate that inclusion in emergent literacy activities such as participation in predictable story reading and daily functional writing activities leads to beneficial results in both oral and written language development with persons with a wide range of disabilities (Decoste, 1993; Katims, 1991; Steelman, Pierce, Alger, Shannon, Koppenhaver, & Yoder, 1993).

Pierce and Porter (1996) conclude, in order for persons with disabilities to develop total communication abilities, they must be enabled to more successfully participate in mainstream educational, vocational, and leisure settings. It is therefore necessary for persons with cognitive disabilities to receive total communication programming which is rich in both oral and written language input and opportunities for useful, functional, and enjoyable written language output. The use of assistive technology and multimedia tools to help individuals with more severe disabilities to develop and practice literacy is often necessary.

For students with cognitive disabilities and others who have serious learning challenges, success and progress may be slow because much of their instruction is centered around their weaknesses rather than capitalizing on their strengths, preferences, and cultures (Daiute and Morse, 1996). In a case study by Daiute and Morse (1994), three children with serious writing problems were able to adapt the multimedia context making it flexible to their own strengths and needs. Children use images to improve their comprehension and production of text. Images and sounds can be useful tools for bringing children's experiences into the classroom. These children have much to share and want to be heard and valued. "Computers sometimes provide the only means a person with a

disability has for reading, writing, or speaking (The Alliance for Technology Access, 1994, p. 21).

Multimedia is a powerful vehicle for capitalizing on student strengths. The visual and auditory media that it incorporates may hold particular advantages for students with disabilities. Cavalier et al.(1994) report that students with learning difficulties may prefer working with visual and auditory media and may have distinctive talents in using these media that would not be displayed if their mode of communication were limited to reading and writing. Multimedia technology makes it more feasible than ever before for students to obtain information and express themselves through auditory and visual modes.

Learning Styles of Students with Cognitive Disabilities. The theory of multiple intelligences (Gardner, 1983) challenges old beliefs about what it means to be smart. Gardner believes that our culture has focused too much attention on verbal and logical thinking, the abilities typically assessed on an intelligence test, and neglected other ways of learning. The theory of multiple intelligences suggests that there are different ways to be smart. Armstrong (1993) states this theory "incorporates the broad spectrum of human abilities into a sevenfold system that can make any person a winner in life." This multiple intelligence model provides an understanding of all the different learning disabilities that people experience. Armstrong (1993) explains,

> there are specific learning disabilities in each of the seven intelligences. Since our culture is heavily oriented toward linguistic and logical-mathematical intelligences, most of the learning disabilities focused on by the media tend to cluster around logical and verbal skills: dyslexia (trouble reading), dysgraphia (trouble writing), dyscalculia (trouble with arithmetic calculation), and other academic problems. (p. 171)

The single most important guideline to keep in mind when tackling learning challenges is "don't let your learning difficulties get in the way of being a successful human being" (Armstrong, 1993). Psychologists tell us that a negative "self-fulfilling prophecy" can have a harmful effect on one's sense of self-worth. We need to regard learning challenges as something that makes one a richer and more unique human being. Many successful individuals with learning challenges have discovered they can bypass their difficulties and find alternative ways of accomplishing tasks. Armstrong (1993) affirms,

> modern technology has now rendered many learning disabilities virtually obsolete by providing learners with access to alternative ways of getting information and expressing themselves. Poor spellers have access to spell checkers. Individuals with illegible handwriting can use a word processor to produce a neat typescript. People with dyscalculia benefit from having a pocket calculator. Learners with poor memories can tape lectures, discussions, and other verbal exchanges. Book-shy people now have audiotapes, videotapes, and a range of computer programs

available for getting information on a wide variety of topics. (p.178-179)

In his extensive research into human learning, Howard Gardner has demonstrated how ill-suited traditional school materials and practices are to our natural ways of learning. Gardner submits the best path to genuine understanding for young children is through children's museums and for older children it is through apprenticeships (1991). Adler (1982) reminds us "all genuine learning is active, not passive. It involves the use of the mind, not just memory" (p. 50).

Many studies have attempted to determine how individuals with cognitive disabilities learn. Several traits have been identified that are common to many individuals in this group. Wheeler (1997) describes these traits as: "concrete vs. abstract thought, discrimination skills, storage and recall of information (memory), integration of information, problem solving, and generalization skills" (p. 4).

For many individuals with cognitive disabilities, abstract thought is very difficult. The more tangible the experience for the individual, the more readily will learning take place. It has long been suggested that persons with cognitive disabilities learn best through a " hands-on" approach. "The more concrete the experience, the more realistic the materials and environment, the easier it will be for the individual to learn new skills" (Wheeler, 1997, p. 50). Teaching individuals with cognitive disabilities in artificial environments, through role playing and simulation, and using artificial materials, will make learning difficult for them.

Discriminating what exactly to focus on in learning a new task may be difficult for individuals with cognitive disabilities. Wheeler (1997) explains these individuals:

> need to have clear understanding of why they are being asked to engage in a specific activity. The purpose of the task needs to be made clear to them. If they have no reason for attending to a task or activity, they will focus their attention on something else. (p. 5-6)

Research on individuals with cognitive disabilities (Wheeler, 1997) has shown that their long-term memory functions as efficiently as those who are not similarly disabled. However, the ability of these individuals to store information in short-term memory appears to be significantly impaired. They also tend not to practice the same strategies as nondisabled learners to pass information from short-term memory into long-term memory. However, information that does pass successfully into long-term memory is able to be recalled with the same efficiency as for individuals who are not disabled. This deficiency in short-term memory has definite implications for educators who are attempting to teach individuals new skills. It should be recognized that if time elapses between instructional sessions, information and skills may be lost. Wheeler (1997) reminds us, if we want information to pass into the individuals long-term memory, then it needs to be presented repeatedly with few time lapses in between.

Research has indicated that nondisabled learners organize information as they receive it in order to make retrieval easier. They also tend to practice or rehearse the information if they feel it will be needed at a later

time. Individuals with cognitive disabilities tend to do neither. Unless the material is already preorganized for them or they are encouraged to practice rehearsal strategies, individuals with cognitive disabilities will do very little to ensure long-term retention of information they receive (Wheeler, 1997). Breaking down tasks into "chunks" is one way of helping the individual. The task analysis developed for a given activity should be helpful in determining reasonable "chunks" to introduce to the individual.

Another implication for teaching involves the use of rehearsal strategies: repeating information out loud, silently, or motorically; making some association in their minds; or creating a visual image of some type (Wheeler, 1997). Providing individuals with a written and/or pictorial sequence of tasks may help them eventually remember over time which task follows which. In addition, individuals need to be motivated to remember information and tasks. Educators should be sensitive to this need and make sure that individuals are asked to perform tasks that are meaningful and rewarding.

"Integrating" information refers to the process of bringing parts together to form a whole. For those with cognitive disabilities, integrating bits of information into a whole may not be so easy. Educators need to be sensitive to the difficulties that emerge when consumers are unable to integrate information effectively or efficiently (Wheeler, 1997). "Rather than teaching isolated skills in unrealistic settings and situations, individuals should be taught functional activities that integrate critical skills" (Wheeler, 1997, p. 10). Teaching individuals with cognitive disabilities skills in natural environments and under natural conditions is

most desirable (Wheeler, 1997; Beck, Broers, Hogue, Shipstead, & Knowlton, 1994; Csapo, 1991). Substantial research describes community-based instruction as a powerful setting (Wheeler, 1997) and an educational method providing instruction in the natural environments (Inge, 1992; Smith & Hilton, 1994; Csapo, 1991; Beck et al, 1994).

The ability to problem solve relies on our ability to either remember a solution that we used successfully in the past or to invent a new one. It is evident that individuals with cognitive disabilities may have difficulty problem solving under certain circumstances. As educators we need to allow students opportunities to problem solve. This means that these individuals need to be given the chance to make mistakes that do not endanger their safety and general well-being. Problem solving skills can most effectively be acquired under natural circumstances. "Attempts to teach individuals problem solving skills under artificial conditions is generally not effective and should be avoided" (Wheeler, 1997, p. 11).

Generalization skills refer to the ability to transfer skills learned in one setting to a different environment. Individuals with cognitive disabilities oftentimes have difficulty transferring skills and information from the setting in which it was learned to a new one. Research suggests, once again, the desirability of teaching individuals necessary skills in a natural environment to encourage generalization (Wheeler, 1997; Falvey, 1989; McDonnell, Hardman, Hightower, Keifer-O'Donnell & Drew, 1993). Community-based instruction is an educational method endorsed by numerous studies. Teaching in simulated environments is a poor substitute for teaching in the natural environment.

The learning styles and traits discussed should be considered as challenges to educators as we prepare to support individuals with cognitive disabilities. The diversity of styles among all students implies that students need a variety of opportunities to show their talents and achievements. Learning functional skills within community settings help individuals increase their odds for independence and a high quality of life. These types of programs and strategies also help all students who may not be taught those skills at home. All students can benefit from such instruction.

Developing Functional Skills - Career Awareness. When developing programs for all students, educators need to focus the instruction on students' future needs. "Too often, schools emphasize the skills necessary for students to simply get through the year. Little thought may go into planning and implementing programs that will have the long-term impact of helping students prepare for adulthood" (Smith & Hilton, 1994, p.7).

Between 70% and 80% of students with disabilities are unemployed or underemployed following graduation (Goodship, 1990). Several million individuals with learning challenges are still denied the opportunity to engage in meaningful employment in the United States, and most earn very low wages. The Ohio Advisory Council for Vocational Education (1983) explains, for individuals with handicaps, choosing an appropriate occupation is "more difficult because they are often ill-prepared or under-prepared to make appropriate vocational choices" (p. 5). These individuals do possess the potential to live and work in the community if they receive appropriate life skills instruction. However, without this instruction they often fail to obtain and retain jobs.

Following is a summary of skill areas under Occupational Skills identified by Goodship (1990) starting with early educational efforts:

Explore occupational possibilities.

Identify the rewards of work.

Identify personal values met through work.

Classify jobs into categories.

Investigate local occupational opportunities in the community (make site visitations).

Make realistic occupational choices.

Identify requirements of appropriate and available jobs.

Identify main occupational interests.

Follow directions and observe regulations.

Recognize the importance of attendance and punctuality.

Demonstrate knowledge of safety.

Work with others. (p. 4)

All students, whether having a disability or not, make numerous adjustments or transitions. During the course of their schooling, they must learn to cope with differences in classes, grades, schools, and programs. Ultimately, they must move from the fairly sheltered environment of school into the more competitive world of work. At the June 1984 conference on the school-to-work transition of students with disabilities, a series of recommendations were proposed whereby transition services would begin at the elementary school level through career awareness programming (Naylor, 1995).

More recently, The National School-To-Work Learning and Information Center (1996) has suggested that career awareness activities

should begin as early as kindergarten and continue through elementary school, and can include guest classroom lectures or field trips to work sites to expose young people to a variety of career and occupational opportunities. "The idea is to reach children at an early age and begin building in them a good work ethic" (Spangenburg, 1995, p. 3). In addition, the literature concludes (Taymans, 1982; Kokaska & Brolin, 1985) career education should be part of the special education program from elementary to high school.

In upper elementary and junior high school, career development programs can investigate career exploration activities in which students examine specific careers more closely. At this level, students can participate in job shadowing or mentoring experiences with workers or work on classroom projects that apply academic concepts to the careers they are examining. Through these experiences, young people not only learn about a variety of careers and occupations, but they can also begin to identify what skills are required to succeed in these areas.

Some other examples of career awareness activities in which elementary students can have the opportunity to experience include: planning the layout of a city, running the school store, creating their own newspaper, career fairs, career dress-up days, and developing a career portfolio which includes documentation of individual interests, strengths, skills, personal goals, extra-curricular activities, and accomplishments. The idea behind all these activities is to stimulate students to think about the future, to increase their awareness of career opportunities, and to inspire them to set goals (NASSP, 1995). These types of activities also provide opportunities for students to participate cooperatively as team

members, to negotiate agreements and mediate differences, and to work with others from diverse cultural backgrounds which have been identified as essential by many employers (Hartoonian & Van Scotter, 1996).

Carson, Huelskamp and Woodall report in 1993, "when businesses complain about workers' 'skills', they are generally referring to a lack of work ethic and poor social skills" (p.293). Hence, the mission of a career development program is to promote lifelong learning through career awareness, exploration, and preparation. Career education can affect the work force crisis in the United States by the formation of positive work values starting in kindergarten (Gadd, 1995). Positive work values can affect unemployment, crime, multigenerational welfare cycles, and give meaningful purpose to a youth's hopelessness. Positive work values can help young people develop a positive vision for their future and reasons to choose to work, to stay in school, and a desire to make positive contributions to society. Positive work values pay high returns for all individuals and society and must start at the earliest possible age.

One of the roles of special educators is to provide opportunities for students with disabilities to reach their full potential. All persons with mental retardation can attain some degree of productivity and independence in society, especially when appropriate teaching methods and technologies are provided. Some students need more than a desk, books, paper and pencils to learn. Finding the right motivator or educational tools can stimulate students to want to learn more.

Being sensitive to learning styles and using a multimedia approach to develop career awareness can help students with cognitive disabilities become self-confident, goal-oriented, independent, successful, and

integrated into society. Through community-based instruction, learning about specific jobs will help individuals with cognitive disabilities move into "normalized" work environments and assist their integration into the community.

Chapter 3

Procedures

Methodology. This study has three major goals: 1) to describe the use of multimedia tools and assistive technology to develop career awareness; 2) to describe and analyze the effects and benefits of multimedia tools and assistive technology; and 3) to determine the implications for multimedia and assistive technology use in the education of children.

Based on a naturalistic paradigm, the study will use the qualitative principles detailed by Guba and Lincoln (1982) and McMillan and Schumacher (1997). The data collection methods will utilize various qualitative inquires. The approach will involve data collection procedures, including examination of student records; observations of a small number of students with cognitive disabilities; documentation of observations; analysis of video and audio tapes, photos, and the Hyperstudio project; interviews with parents; questionnaires to teachers and students; and analysis of the interviews and questionnaires.

Multimedia and Assistive Technology Use. Discussion of careers and future job opportunities with students will occur in a one hour session. Using ClairsWorks on a Macintosh computer, students will list jobs they are currently interested in. Intellikeys will be used with those students who need an alternative keyboard. Co-Writer (a word prediction software) and Write-Outloud (a text to speech software) will also be utilized with the word processing program. David (a nonreader) will dictate his responses and they will be typed into Board Maker and/or Picture It (software program that uses pictures together with words).

During this first session, students will also view a HyperStudio sample. This multimedia presentation demonstrates the use of text, sound, graphics, and video clips. This demonstration will give students an idea of what their multimedia presentation will look like. Students will receive a brief explanation of the career awareness activities that will take place during the next 6-7 weeks.

In the second session, students will visit the Careers 2000 Center at Northeast Wisconsin Technical College. Students will spend two hours using the Career-O-Rama CD-ROM, Children's Occupation Outlook Handbook CD-ROM, and the Internet to explore careers and jobs that may be of interest to them. Research found will be printed for future use.

The third one hour session will involve reviewing what was learned at the Careers 2000 Center by discussion and reading over the obtained research. Each student will be asked to choose a job that he/she would like to further explore in the community. Students will begin to formulate questions to ask employees during their visit at the job site. These questions will help students get a better understanding of the skills involved and associated with that job. ClairsWorks, in conjunction with Co-Writer and Write-Outloud, will be used for the question writing process. David's dictated questions will be transcribed to Board Maker and/or Picture It software and printed for his use (see Appendix A).

In the fourth and fifth hour sessions, students will finalize their question writing and practice asking themselves the questions (see Appendix B) using a camcorder and handheld tape recorder. The researcher will make the needed job site contacts and arrange for the job visits.

Four job sites will be visited by the students and researcher (one per week). Students will introduce themselves and interview the employees using their printed questions. While one student interviews an employee the other three students will tape record the conversation using a handheld tape recorder, video tape the interview using a camcorder on a tripod, and take photos of the interview and job site using digitized, 35mm, and Polaroid cameras. A team approach will be used at each job site to gain the information each student needs.

After each job site visit, students will return to school, listen to their interview recorded on tape, review the photos, and view the video. The information gathered at each job site will be organized and put into a HyperStudio stack. Each student will create a stack on the job they researched. The four stacks will be linked together into one multimedia presentation and titled by the students. Students will incorporate information gathered from the Career-O-Rama CD-ROM, Children's Occupation Outlook Handbook CD-ROM, and the Internet, questions asked at the job site visit and the employees responses, video clips and tape recorder clips, and photos taken at their visit. Groliers Encyclopedia CD-ROM may also be utilized if additional information is needed.

The Hyperstudio stack will be saved on a Zip Drive and later downloaded to a video. A copy will be given to each student. Students will view their final project and be asked to complete a questionnaire (see Appendix C). Students will present their Hyperstudio presentation to their homeroom teacher and class. Their general education teacher will be asked to use a Likert scale questionnaire and comment on the presentation

(see Appendix D). The general education peers will be asked to complete a questionnaire and comment on the Hyperstudio presentation (see Appendix E). The speech and language teacher will also be asked to view the Hyperstudio presentation and respond to a Likert scale questionnaire (see Appendix F). Parents will be invited in, asked to view the multimedia presentation, and an interview will be conducted (see Appendix G).

McMillan and Schumacher (1997) highly recommend the researcher conduct a pretest of the questionnaires before using them in a study. Four professionals (in the areas of special education, vocational education, and rehabilitation) reviewed the questionnaires and interview questions. The feedback was used as an informal critique of individual items and assisted in preparing the final questionnaires and interview questions.

The teacher and student questionnaires and the transcripts of recorded parent interviews will later be analyzed as to the effects and benefits of multimedia tools and assistive technology. Documentation of observations made by the researcher throughout the study will be analyzed later, along with an analysis of video and audio tapes, photos, and the Hyperstudio project.

The results from the data collection will subsequently determine the implications for multimedia and assistive technology. During the final analysis, information will be categorized, organized, and implications will be summarized.

Sample. The sample included four fifth grade students who have been identified by a Multidisciplinary Team (M-team) as having one or more handicapping conditions and a need for special education. Summaries of each students' current educational performance follow.

Adam. Adam, is an 11-year-old boy diagnosed with FAS (fetal alcohol syndrome and ADHD (attention deficit hyperactivity disorder). The most recent Wechsler Intelligence Scale for Children, Third Edition (WISC-III) revealed a Verbal IQ of 78, a Performance IQ of 89, and a Full Scale IQ of 81. The Verbal score is in the borderline CD (cognitive disability) range. The Performance score was at the lower end of the average range. The Full Scale score was in the borderline CD range. The Woodcock Reading Mastery Test standard Total Reading Cluster was at a 1.1 grade level and a 6.3 age equivalency. The Test of Written Spelling was at a 1.1 grade equivalency. Woodcock Reading Mastery Test standard scores were reported to be in the CD range. The M-team recommended special education placement in a Cognitive Disabilities and Speech and Language Program. Use of stimulant medication have been helpful with respect to his ADHD.

David. David is an eleven-year-old boy who has undergone numerous surgeries to correct a cleft palate and to repair his right eardrum. Records indicate David has a significant conductive hearing loss in his right ear, was recently referred to a doctor for glasses, and will undergo additional surgery in the next few years to his cleft palate. David has numerous speech sound omissions in the initial position of words, along with hypernasality, which continue to significantly affect overall intelligibility. The most recent Wechsler Intelligence Scale for Children, Third Edition revealed a Verbal IQ of 63, a Performance IQ of 60, and a Full Scale IQ of 57. The current M-team recommended placement in special education in a Cognitive Disability and Speech and Language program.

Justin. Justin is an 11-year-old boy who currently resides with his aunt and uncle. Significant behavioral issues while living with his mother and younger brother are the reason for his current living arrangement. Behavioral records indicated a history of hospitalizations at Bellin Psychiatric Center. Diagnoses from Bellin included "oppositional defiant disorder" and mild to moderate mental retardation. The most recent Wechsler Intelligence Scale for Children, Third Edition (WISC-III) revealed a Verbal IQ of 55, a Performance IQ of 49, and a Full Scale IQ of 48. The results of Justin's current cognitive performances place him in the upper Moderately Cognitively Disabled range. Past special educational services included Cognitive Disabilities, Emotional Disturbance, and Speech and Language programs. The current M-team recommended placement in special education in a Cognitive Disability and Speech and Language Program. Use of stimulant medication has been reported to make behaviors more manageable and much less hyperactive.

Katie. Katie is an 11-year-old girl born at six months gestation, weighing 18 ounces. She was hospitalized 99 days. Medical data indicates Katie was visually impaired as a result of retinopathy of prematurity (a condition that sometimes occurs after prolonged oxygen therapy is given to premature infants). Specific diagnostic information indicated Katie was totally blind in her left eye and had visual acuity of 20/250 in her right eye. She was reported to have "marked bilateral mystagmus," a condition in which there is involuntary rapid movement of the eyeball. The most recent Stanford Binet Intelligence Scale, Fourth Edition revealed Katie's Verbal Reasoning = 80, Abstract/Visual

Reasoning = 68, Short-Term Memory = 81, and total Test Composite = 72. The total Test Composite score was in the Cognitive Disabilities range. A past cumulative record review indicated Katie to have received special educational services in a Visual Impairment and Speech/Language Program. Katie also received Occupational Therapy services in the past. Currently, the M-team recommended placement in special education be in a Cognitive Disabilities Program and consultation from a Visual Impairment teacher. Katie wears glasses and reports indicate she has good residual vision.

Chapter 4

Results

The purpose of this chapter is to present and analyze the data collected in this study. Qualitative data regarding technology use for each student will be summarized. The effects and benefits of multimedia tools and assistive technology will also be described.

All questionnaire and interview instruments used with participants were pretested by a professional panel, as recommend by Guba and Lincoln (1982) and McMillan and Schumacher (1997). The members of this panel had expertise in the areas of assistive technology, speech and language, vocational rehabilitation, vocational education, and special education (see Appendix H). The panel reviewed and found the questionnaire and interview instruments to be effective and assumed valid.

Analysis of Multimedia and Assistive Technology. The four students in this sample participated in a seven week career awareness exercise in which they utilized the equipment listed in Chapter 1, Table 1. Summaries of each case study follow.

Adam. Prior to this study, Adam had little experience with computers and other technology. In the first session, he viewed the HyperStudio sample presented by the researcher with great attentiveness and curiosity. He asked, "Are we going to do that? Great!"

At the Northeastern Wisconsin Technical College Careers 2000 Center, Adam used the CD-ROM software with ease and independence. Adam's interest in a construction career was reinforced after researching the topic on the Internet and CD-ROM software. He independently took notes from the CD-ROM software and from the Internet and by writing

down key words throughout the two hour visit. Adam shared that he enjoys quiet places such as going into the community to learn. He asked several times if he could be the first one to interview at a job site. From the beginning, Adam demonstrated much enthusiasm for this assignment.

Adam is currently learning keyboarding skills and is becoming very proficient at typing (an obvious strength). He wrote his interview questions using word prediction and text-to-speech software independently and quickly. Adam likes using multimedia and other technology because "it is fun and easy to use."

During the weeks of training, Adam appeared eager to use the equipment. His skill level progressed rapidly. Later in the study, Adam helped train some of his peers. At his job site visit, he set up the video recorder and tripod without hesitation and assisted peers when necessary. The contractor Adam interviewed commented on how well he and the other students did using all the equipment. Adam told the gentleman, "I had a lot of fun interviewing you."

Adam became familiar with the HyperStudio program and tool functions within two days. By the third day, Adam was working on individual cards within his stack independently. When recording his own voice for his HyperStudio stack, Adam needed to articulate his sentences with volume and clarity. These are two of his I.E.P objectives. After struggling with this task initially, Adam's recordings became more clear and audible and were completed with ease and confidence.

The computer applications, use of cameras, tape recorder, and video camera seemed motivating to Adam. He appeared to experience success using all the equipment. He demonstrated a sense of pride when sharing

the completed HyperStudio presentation with his general education peers, teachers, and family. This career awareness activity using assistive technology and multimedia tools clearly met Adam's interests, strengths, and preferences. This activity provided a means to develop self-esteem and communication skills. A printed copy of the HyperStudio stack Adam and the other three students completed can be found in Appendix I.

David. On the day the career awareness project was introduced to the group and on the day the group went to the N.W.T.C. Careers 2000 Center, David was absent. However, he had previous experience using HyperStudio and was familiar with the software. When the researcher explained the project to him he exclaimed, "Oh, good. I like using HyperStudio." David used the Internet at school to do research on careers. He wanted to explore the career of a baker.

David (a nonreader) dictated five questions to the researcher that he wanted to ask during his interview at the job site visit. The questions were transcribed into Picture It software and printed for David to use (see Appendix A). The researcher read the questions to David pointing to the picture cues that accompanied the words. David was able to read the sentences independently by the second day of practice. He was successful in reading his questions on the actual job site interview. While on the job site visit, the baker he interviewed said, "He did a great job."

David appears to enjoy conversing with others in spite of his speech sound omissions and hypernaslity which frequently makes his speech unintelligible. He seems to be a very social youngster. David seemed to experience great pleasure using the handheld tape recorder and used it with ease. During the practice sessions, he would interview the students

and the researcher in the room as if he were a news reporter. He told the teacher that someday he would like to be a game show host.

David seemed to display great pleasure using the various cameras and other equipment throughout the study. He was able to set up the tripod for the video camera independently and showed the researcher how to use the extra handles in the box. When asked what he liked best about this assignment, David responded, " I love doing things with my hands. You can press a lot of things on cameras and video recorders." David had an unbroken smile when he presented the HyperStudio presentation to his parents. The pride he displayed was remarkable.

The equipment David used in this study met his learning style, interests, and preferences. The Picture It software provided a means for David to read and participate in the interviewing activity as his peers did. The Intellikeys (adaptive keyboard) provided David a means to access the computer with independence and success. The recorded voice clips gave David needed feedback for him to articulate clearly and slowly. These skills are addressed in David's I.E.P. Using the multimedia equipment provided David an opportunity to problem solve and demonstrate to others his strengths and capabilities.

Justin. During the initial explanation of the career awareness project, Justin voiced great excitement stating, "Neat. I can't wait. Let's stay here all night and work on it." Justin had prior experience with HyperStudio.

At the N.W.T.C. Careers 2000 Center, Justin was uncertain as to the career he wanted to report on, but became very engaged in using the CD-ROM software. He smiled and laughed at the sound effects and animation. After viewing the career awareness CD-ROM software on

automobile mechanics, he told the staff that he really liked motorcycles. N.W.T.C. staff led him through the Internet site designed for children exploring occupations. They were able to locate information on motorcycle technicians. Justin left the center and seemed pleased with information he had acquired. When the researcher told Justin he would be able to interview a motorcycle technician at a Harley-Davidson business, he threw his hands up in the air and yelled, "Alright!"

Justin composed his interview questions using word prediction and text-to-speech software. He needed minimal assistance in doing so. He was able to read his questions without hesitation. Justin asked every day when he would be able to use the digitized camera. He became independent using the equipment after a one week training period. The day before his job site visit Justin commented, "I can't wait until tomorrow."

At the end of the interview and tour of the Harley-Davidson business, the motorcycle technician told Justin what a good job he had done. He asked Justin and the other students if they would like to sit on a motorcycle. Except for Katie, they all accepted the offer. Justin insisted the other students take pictures and record the event on video. He asked if he could put the pictures in his HyperStudio presentation. This job site visit appeared to be highly motivating for him.

Justin completed his HyperStudio stack quickly. He was able to use the tools and functions within the application within two days. He seemed to enjoyed recording his voice and asked to do the final voice button on the credits stack. He smiled during the entire presentation to his peers and

family, laughing when the students positively responded to seeing him sitting on a Harley-Davidson motorcycle.

The use of the multimedia tools and community-based instruction in this study appeared to be motivating and beneficial to Justin. Through this career awareness activity, Justin gained confidence in himself, something that he often lacks. He demonstrated to himself and others his talents, abilities, and interests.

Katie. Katie had previous experience with HyperStudio but not video or camera use. When the career awareness activities were initially explained to the group and the HyperStudio sample was shown, Katie smiled and giggled throughout the period. She exclaimed to the group, "Wow! Yes! It's going to be fun!"

Katie had previous experience with the Intellikeys, Write-Outloud, and Co-Writer software. She composed her questions independently on the computer using assistive technology. Katie learned how to use the cameras and tape recorder within a week of training. The digitized camera with view finder appeared to be most beneficial and accommodated her vision challenges.

Katie has a great interest in animals. She confidently told the staff at the N.W.T.C. Careers 2000 Center she wanted to research animal caretakers. She obtained information from both the CD-ROM software and the Internet. Upon returning from the Center, Katie commented, "David missed out on a great opportunity today."

Her job site visit and tour took place at the Bay Area Humane Society and Animal Shelter where she interviewed the associate director. The associate director was impressed with all the equipment the students

brought with them and the ease in which they handled the equipment. After Katie's interview, she commented how professional a job Katie did. Katie has strong communication and social skills. She had an opportunity to hold and pet some of the animals. She told the group she would like to work at an animal shelter someday.

When asked what part of the career awareness assignment she liked best, Katie said creating the HyperStudio presentation was the most rewarding for her. Katie appears to be a strong auditory learner and has good long-term memory. These strengths were apparent after the first day of working on her HyperStudio stack. She completed the remainder with ease and quickness. She told the researcher, "recording your voice and listening to the computer talk is the best part of HyperStudio." After finishing her stack, Katie asked when the group could do another.

Katie giggled and smiled during the presentation to her general education teacher, general education peers, and to her mother. She was obviously elated by the applause from her general education peers and teacher and their many positive comments. She and the other students in this study received numerous compliments and recognition from their work.

The assistive technology and multimedia equipment evidently addressed Katie's learning style, strengths, and interests. This learning activity appeared to be highly inspirational for Katie. The multimedia tools and assistive technology provided Katie an opportunity to discover and use her gifts and talents. It gave opportunities for Katie to be independent and successful in the school environment.

Analysis of Parent Data. Parents/Guardians were interviewed separately and asked to respond to the following questions. Are you aware of any school work the student has done using a computer or other technology? If yes, did he or she appear to enjoy doing the school work? Do you feel use of a computer and other technology helps the student learn? Do you feel the student has fun while using the computer and other technology? In addition, they were asked to comment about how they felt after viewing the completed HyperStudio project in which their son/daughter/nephew participated in.

All parents/guardians reported the following: their child/nephew spoke of various computer activities they did throughout the school year, use of computers and other technology is fun for their son/daughter/nephew, computer use is preparing their son/daughter/nephew for the world of work, computers and other technology help their son/daughter/nephew learn, and their son/daughter/nephew was proud of his/her computer work.

Following are quotes from the parents/guardians about the project. "My kids want me to buy them a computer now. Eric (Adam's brother) wants to sign up for your class." "This assignment made me more aware of how capable Justin is. I can see the talents and the potential he has." "Katie practiced her interview questions at home and also had everyone else's interview questions memorized. She really enjoyed interviewing the lady at the animal shelter." "It sure looks fun. I wish I had computers when I went to school." "Justin uses our small computer at home all the time. He loves hands-on activities." "Eventually everyone is going to be using technology and computers every day. Katie will probably need to know how to use computers for her job some day." "They (computers)

are helping David learn to read by using the pictures. It helps him learn more and helps him express himself. I really understood what he said." "I saw Justin smile during his entire presentation. He talked about his time at the Harley-Davidson business for days." "Students don't have this opportunity every day to use cameras and video equipment. It can help him learn and he sure is having fun while he is learning."

Clearly, parents/guardians concluded computers and other technology lead to positive academic and emotional outcomes. Parents/guardians became more aware of their child's/nephew's interests, talents, and their potential to learn through this study. They all agreed computers and other technology address the learning styles of their son/daughter/nephew and are motivating too. Parents/guardians also concurred this career awareness activity using technology is preparing their son/daughter/nephew for the world of work.

Analysis of Student Data. Students were asked to evaluate the effects and benefits of computer use and other technology used in this study. Table 2 displays the questions asked to the students participating in this study.

Table 2

Questions Asked to Students Participating in this Study

1. Doing research at the NWTC Career 2000 Center helped me learn.
2. Visiting job sites in the community helped me learn.
3. I learned about myself and things that I like to do.
4. I learned about jobs that I can do in the future.
5. Computers and other technology make assignments fun to do.
6. Computers and other technology help me learn.
7. Computers and other technology help me say what I want to say.
8. I am proud that I know how to use computers and other technology.
9. Others are impressed by the work I do on the computer and with other technology.
10. I prefer using computers and other technology to learn rather than doing paper and pencil activities.
11. Using the computer and other technology helps me to be more independent in school.

All four participants agreed doing research on the Internet and using the CD-ROM software at the N.W.T.C. Career 2000 Center and visiting job sites in the community helped them learn. Three out of four students stated the career awareness activities in this study helped them identify things they liked to do. All four participants agreed computers and other technology made assignments fun and helped them learn. All participants reported computers and other technology helped them express themselves and added to their independence in school. Students concurred they were proud to know how to use computers and other technology and others were impressed by their work. In addition, all four students indicated they prefer using computers and other technology to learn rather than doing paper and pencil activities.

Analysis of Teacher Data. The general education (homeroom) and speech and language teachers of the students in this study were asked to evaluate the effects and benefits of computer use and other technology (see Appendices D and F). Both teachers agreed the use of computers and other technology facilitated communication, developed problem solving skills, enhanced social interaction with peers and adults, developed self-esteem, improved independence, addressed learning styles, developed vocabulary and literacy skills, promoted successful participation in the regular educational environment, developed career awareness, and prepared students for the world of work.

In addition, the speech and language teacher indicated the use of computers and other technology provided an alternative means of self-expression and developed receptive language skills in students. She

also reported computers and other technology can be used effectively to meet the needs of students with other disabilities.

The general education teacher indicated the career awareness presentation provided meaningful and appropriate information to all the students who observed the presentation. In addition, he concluded computers and other technology can be used to develop other curricular areas and were effective methods of instruction with all students. These findings encourage the use of more computers and other technology in the areas of special and general education.

Analysis of Regular Education Student Data. The general education peers of the students in this study were asked to evaluate the effects and benefits of computer use and other technology. Twenty participants viewed the HyperStudio presentation created by the students in this study. Ninety percent of the participants found the presentation interesting to watch, learned about jobs they can do in the future, and were impressed by what the students created. Ten percent indicated they were not sure. Ninety percent of the general education peers also reported computers and other technology make learning fun, while ten percent indicated they were not sure. In addition, when asked if participants would like to visit job sites in the community to learn more about careers, eighty-five percent indicated yes, five percent responded no, and ten percent were not sure.

Table 3

Summary of Regular Education Student Data

Effects and Benefits	Responses		
	Yes	No	Not Sure
The HyperStudio Presentation was fun and interesting to watch.	90%	0	10%
I learned about jobs/careers I can do.	90%	0	10%
I am impressed by the HyperStudio presentation on careers.	90%	0	10%
Computers and other technology make learning fun.	90%	0	10%
I would like to use computers and other technology to do more assignments.	95%	5%	0
I would like to visit job sites in the community to learn more about careers.	85%	5%	10%

Table 3 displays the general education peers' responses given in this study. When asked if students would like to use computers and other technology to do more assignments, ninety-five percent of the participants responded yes, while five percent indicated no. These findings suggest

computers and other technology be used more in the general educational setting.

Summary. The purpose of this chapter was to present the data gathered from the analysis of: field notes, parent/guardian responses, sample responses, and student and teacher responses. The analysis was intended to describe the effects and benefits of multimedia tools and assistive technology. The data analysis based on a naturalistic approach included: observation and documentation of a small number of students with cognitive disabilities, interviews with parents, and questionnaires to teachers and students.

Chapter 5

Conclusion

The purpose of this study was to describe the use of multimedia tools and assistive technology to develop career awareness of students with cognitive disabilities. Additionally, this study analyzed the effects and benefits of multimedia tools and assistive technology. Qualitative data were collected through a triangulation of measurement processes as recommended by McMillan and Schumacher (1997) and Guba and Lincoln (1982). Data collection methods included observations, field notes, self designed questionnaires and formal interviews with students, teachers, and parents.

As there was little research available on the use of multimedia tools to develop functional skills, more specifically career awareness of students with cognitive disabilities, this research study was designed to determine the effects and benefits of multimedia tools and assistive technology. In addition, this study gave fifth grade students with cognitive disabilities opportunities to become aware of the broad range of careers and/or occupations in the world of work.

The sample included four fifth grade students who have been identified by a Multidisciplinary Team (M-team) as having one or more handicapping conditions and a need for special education. The four students in this sample participated in a seven week career awareness exercise using various multimedia tools and assistive technology.

Upon completion of data collection, the researcher analyzed field notes from observations, video and audio tapes, student sample questionnaires, parent interviews, regular education teacher questionnaires, speech and

language teacher questionnaires, and general education student questionnaires to determine the effects and benefits of multimedia use and assistive technology.

Discussion of the Findings. The positive effects and benefits of multimedia tools and assistive technology use were apparent from this research. All participants reported students' strengths, interests, and preferences were addressed through the use of technology. Positive academic, social and emotional outcomes were reported by all students, parents/guardians, and teachers. The findings yield that communication skills and problem solving were developed in students with cognitive disabilities. Students in the sample, teachers and parents/guardians found the use of assistive technology and multimedia tools motivating.

Parents/Guardians reported a greater awareness of their child's/nephew's talents and their potential to learn through this study. Parents/Guardians and teachers concluded this career awareness activity using technology prepared students for the world of work. When asked if students would like to use computers and other technology to do more assignments, all participants in the sample indicated they would, and 95% of regular education students participating in the study agreed.

Teachers reported the benefits of using computers and other technology included development in vocabulary and literacy skills. Teachers also concluded using technology promoted successful participation in the regular educational environment. In addition, the speech and language teacher determined computers and other technology can be used effectively to meet the need of students with other disabilities. The general education teacher reported computers and other technology can be

used to develop other curricular areas and was an effective method of instruction with all students.

The analysis revealed using assistive technology and multimedia tools can be an effective means of instruction to develop functional skills in students with cognitive disabilities. The benefits of technology applications were apparent in the areas of academic, social and emotional development in all students in the sample. Parents and teachers agreed, this career awareness exercise using technology prepared children for the world of work.

Implications

The results of this study suggest implications regarding the use of assistive technology and multimedia tools to develop additional functional skills in students in special education programs and the use of multimedia tools to be used to a greater extent in teaching students in general education.

This study clearly supports the use of computers and other technology as an effective learning tool with students with cognitive disabilities and technology goals addressed in their I.E.P.'s. The findings confirm the claims of many professionals that technology leads to more successful participation in the mainstream whereby students are able to participate in content appropriate to their age level. Technology helps teachers and others become more aware of what these students can do and their potential to learn.

The results support the contention that assistive technology provides the tools for children who are not able to access the people, objects, and events of their world, or to do some things independently. Technology is

not a frill for students with sensory, communication and cognitive limitations, but a useful tool and way to learn.

One of the most powerful findings of this study is the evidence of positive social and emotional change when students with disabilities use multimedia and assistive technology. Research indicates computers and other technology promote autonomy and build self-confidence. Students feel special, like they can do something their peers may not be able to do. This study provided useful information to educators of students with exceptional educational needs, especially those who teach students with cognitive disabilities. Additional research is needed to determine if other functional skills can be developed through the use of assistive technology and multimedia tools.

The results of this study suggest educators look at multimedia tools to be used to a greater extent in the teaching of students in general education. The findings confirm the claims of numerous professionals that multimedia instruction can address the learning styles of all students and is a fun and exciting way to teach. The strengths, talents, and gifts of students are there, we just have to uncover them and technology gives educators a means to do this. Multimedia tools foster self expression and creativity and require critical thinking and problem solving. Technology helps students become more active learners.

Multimedia tools can be used to learn academic subjects and other life-long skills. Further research is needed to determine the extent to which multimedia tools are used in the education of regular education students and the challenges and barriers that interfere with the use of computers and other technology.

References

Adler, M., (1982). The paideia proposal : an educational manifesto. Macmillan: New York.

Agnew, P.W., Kellerman, A.S., & Meyer, J. (1996). Multimedia in classroom. Boston: Ally & Bacon.

Alliance for Technology Access. (1994). Computer resources for people with disabilities. Hunter House: Alameda, CA.

American Association on Mental Retardation (1995). Mental retardation definition, classification, and systems of supports workbook. Washington D.C.: American Association on Mental Retardation.

ARC Q & A. (1993). Assistive Technology for People with Mental Retardation. National Headquarters, Texas.

Armstrong, T. (1993). 7 kinds of smart. New York: Penguin Group.

Barnes, B. & Hill, S. (1983). Should young children work with microcomputers-Logo before lego? The Computing Teacher, 10(9), 11-14.

Beck, J., Broers, J., Hogue, E., Shipstead, J., & Knowlton, E. (1994). Strategies for functional community-based instruction and inclusion for children with mental retardation. Teaching Exceptional Children 4, 44-48.

Brinker, R., & Lewis, M. (1982). Making the world work with microcomputers: A learning prosthesis for handicapped infants. Exceptional Children, 49(2), 163-170.

Blackhurst, A.E. (1977). Perspectives on technology in special education. Teaching Exceptional Children (5), 41-48.

Brady, E. & Hill, S. (1984). Young children and microcomputers: Research issues and directions. Young Children, (39), 49-61.

Butler, C. (19880. High tech tots: Technology for mobility, manipulation, communication and learning, in early childhood. Infants and Young Children, 49(2), 163-170.

Carson, C., Huelskamp, R., & Woodall, T. (1993). Perspectives on education in America: A annotated briefing. Journal of Educational Research (5), 293-294.

Cavalier, A.R., Ferretti, R.P., & Okolo, C.M. (1994). Technology and individual differences. Journal of Special Education Technology 12 (3), 175-181.

Church, G. & Glennon, S. (1992). The handbook of assistive technology. SanDiego: Singular Publishing Group, Inc.

Clements, D. (1987). Computers and young children: A review of research. Young Children, 43 (1), 34-44.

Clements, D. & Nastasi, B. (1985). Effects of computer environments on social-emotional development: Logo and computer assisted instruction. Computers in the Schools, 2, 11-31.

Copel, H. (1991). Tech Use Guide: Students with moderate cognitive abilities. (Technical Report). Resont, VA: Center for Special Education Technology.

Csapo, M. (1991). Community-based instruction: Its origin and description. British Columbia.

Daiute, C. & Morse, F. (1994). Access to knowledge and expression: multimedia writing tools for students with diverse needs and strengths. Journal of Special Education Technology 12 (3), 221-256.

Decoste, D. (1993). Effects of intervention on the writing and spelling skills of elementary school students with severe speech and physical

impairments. Unpublished doctoral dissertation, George Washington University, Washington, DC.

Erickson, K., & Koppenhaver, D. (1995). Developing a literacy program for children with severe disabilities. The Reading Teacher, 48, 676-684.

Esposito, L., & Campbell, P. (1987). Computers and severely and physically handicapped individuals. In J.D. Lindsay (Ed) Computers and Exceptional Individuals. Columbus: Merrill Publishing Co.

Falvey, M. (1989). Community-based curriculum. (2nd ed.) Baltimore: Paul H. Brookes.

Gadd, L. (1995). Elementary and middle school career education. The Role of Career Education in School-to-Work Transition. Center on Education and Training for Employment, College of Ohio State University.

Gardner, H. (1983). The unschooled mind. New York: Harper-Collins.

Gardner, H. (1991). The unschooled mind: How children think and how schools should teach. Basic Books: New York.

Garner, J., & Campbell, P. (1987). Technology for persons with several disabilities: Practical and ethical considerations. Journal of Special Education, 21, 122-132.

Goodship, J. (1990). Life skills mastery for students with special needs. ERIC Digest E469.

Guba, E., & Lincoln, Y. (1982). Effective evaluation: Improving the usefulness of evaluation results through responsive and naturalistic approaches. Jossey-Bass Publishers: San Francisco.

Hadly,W. (19 92). Technology and the handicapped. The Technology Teacher 11, 15-20.

Hartoonian, M. & Van Scotter, R. (1996). School-to-work: A model for learning a living. Phi Delta Kappan 77 (8), 555-560.

Hogan, C. (1995). Career awareness: successful strategies that work. NASSP Bulletin 79 (570), 30-36.

Holder-Brown, L., & Parette, Jr. H. (1992). Children with disabilities who use assistive technology: Ethical considerations. Young Children, 47,(6) 73-77.

Holzberg, C. (1994). Technology in special education. Technology and Learning 14 (7), 18-21.

Holzberg, C. (1996). Special ed success stories. Technology and Learning 16 (3), 35-41.

Hutinger, P. (1994). State of practice how assistive technologies are used in educational programs of children with multiple disabilities: A final report for the project effective use of technology to meet educational goals of children with disabilities. U.S. Department of Education, Office of Educational Research and Improvement, Educational Resources Information Center, Washington, D.C..

Inge, K. (1992). Transition from school to adulthood for young people with disabilities. Rehabilitation Research and Training Center at Virginia Commonwealth University.

Kahl, B. (1997). IDEA reauthorization: WASDA Bill Kahl seminar. In G. Ruesch, Legal Issues Seminar (pp. 1-19). Quarles & Brady: Milwaukee, WI.

Katims, D. (1991). Emergent literacy in early childhood special education: Curriculum and instruction. Topics in Early Childhood Special Education, 11(1), 69-84.

Kokaska, C., & Brolin, D. (1985). Career education for handicapped individuals. (2nd ed.) Columbus: Charles E. Merrill Publishing Company.

Koppenhaver, D., Coleman, P., Pierce, P., Kalman, S. & Yoder, D. (1991). The implications of emergent literacy research for children with developmental disabilities. American Journal of Speech-Language Pathology, 1 (1), 38-44.

Koppenhaver, D., Pierce, P., Steelman, J., & Yoder, D. (1995). Contexts of early literacy interventions for young children with disabilities. In M. Fey (Ed.), Language intervention in the early school years. Baltimore: Brookes.

Lester, J. & Perry, N. (1995). Assessing career development with portfolios. ERIC Digest 47.

Lusk, L. (1994). Assistive technology and the IEP. Parent Education Project of Wisconsin, Inc., Milwaukee, WI.

McCormick, L. (1987). Comparison of the effects of a microcomputer activity and toy play on social and communication behaviors of young children. Journal of the Division for Early Childhood, 11, 195-205.

McDonnell, J., Hardman, M., Hightower, J., Keifer-O'Donnell, R., & Drew, C. (1993). Impact of community-based instruction on the development of adaptive behavior of secondary-level students with mental retardation. American Journal on Mental Retardation 97 (5), 575-584.

McMillan, J., & Schumacher, S. (1997). Research in education: A conceptual introduction. Longman: New York.

Meyers, L. (1986). By-Passing the prerequisites: The computer as a language scaffold. In M. Gergin (Ed.), Microcomputer Technology for Special Education: Proceedings from Closing the Gap's 1986 Conference. Hutchinson, MN: Crow River Press.

Meyers, L. (1990). Technology: A powerful tool for children learning language. OSERS News in Print!, (2-7).

Muhlstein, E. & Croft, D. (1986). Using the microcomputer to enhance language experiences and the development of cooperative play and preschool children. Unpublished manuscript, DeAnza College, Cupertino, CA.

Muller, A. & Perlmutter, M. (1985). Preschool children's problem-solving interactions at computers and jigsaw puzzles. Journal of Applied Developmental Psychology, 6, 173-186.

National School-to-Work Learning and Information Center (1996). Career development in school-to-work. Resource Bulletin June 1996. Washington, D.C.

Naylor, M. (1995). Role of vocational education in transition services for handicapped youth. ERIC Digest 47.

Pappas, C., Kiefer, B., & Levstik, L. (1990). An integrated language perspective in the elementary schools. New York: Longman.

Parette, H. (1991). The importance of technology in the education and training of persons with mental retardation. Education and Training of Persons With Mental Retardation 26 (2), 165-178.

Parette, H., & VanBiervliet, A. (1991). Rehabilitation assistive technology issues for infants and young children with disabilities: A preliminary examination. Journal of Rehabilitation, 57(3), 27-36.

Parette, P. (1997). Position statement regarding assistive technology devices and services. Division on Mental Retardation and Developmental Disabilities. Southeast Missouri State University, MO.

Pierce, P., & Porter, P. (1996). Helping persons with disabilities to become literate using assistive technology: Practice and policy suggestions. Focus on Autism & Other Developmental Disabilities 11, (3) 142-148.

Quality Education Coalition. (1997, Summer). Wisconsin Coalition for Advocacy, 1 (3), 1-4.

Raver, S., & Dwyer, R. (1986). Teaching handicapped preschoolers to sight read using language training procedures. Reading Teacher 40, 314-321.

Rogow, S. (1982). Rhythms and rhymes: Developing communication in very young blind and multihandicapped children. Child: Care, Health, and Development, 5 (2), 59-62.

Schweigert, P. (1989). Use of mircoswitch technology to facilitate social contingency awareness as a basis for early communication skills. AAC Augmentative and Alternative Communication, 5(3), 192-198.

Shane, H. & Anastasio, V. (1989). Augmentative communication considerations in pediatric otolaryngology. Otolaryngologic Clinics of North America, 22(3), 501-517.

Smith, T., & Hilton, A. (1994). Program design for students with mental retardation. Education and Training in Mental Retardation and Developmental Disabilities, 29(1), 3-8.

Smith, T., Price, B. & Marsh, G. (1986). Mildly handicapped children and adults. St. Paul: West Publishing.

Spangenburg, C. (1995). Implementing a school-to-work transition system: A Rochester, New York, case study. National Center on Education and the Economy.

Special Education Report, Special Supplement. (1997). 1997 individuals with disabilities education act analysis. (Vol. 23, No.14). Capitol Publications Inc. Alexandria, VA: Author.

Spiegel-McGill, P., Zippiroli, S., & Mistrett, S. (1989). Mircocomputers as social facilitators in integrated preschools. Journal of Early Intervention, 13 (3), 249-260.

Steelman, J., Pierce, P., Alger, J., Shannon, J., Koppenhaver, D., & Yoder, D. (1993). Developing an emergent literacy curriculum for young children with developmental disabilities. Clinical Connection 6, (4), 10-15.

Swigger, K. & Swigger, B. (1984). Social patterns and computer use among preschool children. AEDS Journal, (17), 35-41.

Taymans, J. (1982). Career/vocational education for handicapped students: A joint venture throughout the school years. The Pointer, 26 (4), 13-17.

Technology-Related Assistance for Individuals with Disabilities Act of 1988, PL 100-407. (1988). Title 29, U.S.C.2201 et seq: U.S. Statutes at Large, 102, 1044-1065.

The Ohio Council For Vocational Education. (1983). Handbook on mainstreaming handicapped students in vocational education. The Ohio Advisory Council.

Todis, B. & Walker, H.M. (1993). User perspectives on assistive technology in educational settings. Focus on Exceptional Children 26 (3), 1-16.

Traynor, C., & Beukelman, D. (1984). Nonvocal communication augmentation using microcomputers. Exceptional Education Quarterly 4(4), 90-103.

United States House of Representatives (1997). A bill to amend the individuals with disabilities education act, to reauthorize and make improvements to that act, and for other purposes. (Report No. 105-95). Washington, DC: U.S. Government Printing Office.

Wasson, P., & Keeler, J. (1984). [Changing response ratios of normal and handicapped children]. Unpublished raw data.

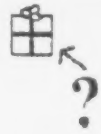
Wehmeyer, M. (1996). The use of assistive technology by people with mental retardation and barriers to this outcome: A pilot study. Technology and Disability, 4, 195-204.

Wheller, J. (1997). Learning from those we support: A teaching guide for human service staff. Stoughton, WI: Castlewood Publications

Wisconsin Department of Public Instruction's Assistive Technology Initiative (1995). Assessing students' needs for assistive technology. Madison, WI.

Appendix A

David's Interview Questions

1 

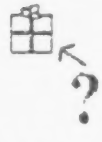
1. What time do you start your work?

2

2. Is your job safe or dangerous?

3

3. Do you supervise people?

4 

4. What makes this job fun?

5

5. Do you have to wear special clothes?

Appendix B

Justin's Interview Questions

1. How many years did you have to go to school for this job?

2. What is the starting pay for a motorcycle technician?

3. Do you work on other types of vehicles?

4. How many hours do you work a week?

5. Do you get to ride the Harley-Davidson motorcycles?

Appendix C

Student Questionnaire

Listed below are a series of statements. Please indicate whether you agree with each statement by circling either 1 for Yes, 2 for No, or 3 for Not Sure.

	Yes	No	Not Sure
1. Doing research at the NWTC Career 2000 Center helped me learn.	1	2	3
2. Visiting job sites in the community helped me learn.	1	2	3
3. I learned about myself and things that I like to do.	1	2	3
4. I learned about jobs that I can do in the future.	1	2	3
5. Computers and other technology make assignments fun to do.	1	2	3
6. Computers and other technology help me learn.	1	2	3

	Yes	No	Not Sure
7. Computers and other technology help me say what I want to say.	1	2	3
8. I am proud that I know how to use computers and other technology.	1	2	3
9. Others are impressed by the work I do on the computer and with other technology.	1	2	3
10. I prefer using computers and other technology to learn rather than doing paper and pencil activities.	1	2	3
11. Using the computer and other technology helps me to be more independent in school.	1	2	3

Appendix D

General Education Teacher Questionnaire

Listed below are a series of statements. After viewing the Hyperstudio presentation on careers created by the four students in this study, please indicate whether you strongly agree, agree somewhat, disagree somewhat or strongly disagree with each statement. (CIRCLE ONE RESPONSE FOR EACH ITEM)

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Not Sure
The use of computers and other technology:					
1. Has facilitated communication.	5	4	3	2	1
2. Has developed problem solving skills.	5	4	3	2	1
3. Has enhanced social interaction with peers and adults.	5	4	3	2	1
4. Has developed self-esteem.	5	4	3	2	1
5. Has developed career awareness.	5	4	3	2	1
6. Has improved independence.	5	4	3	2	1
7. Has addressed learning styles.	5	4	3	2	1
8. Has developed vocabulary.	5	4	3	2	1
9. Has fostered literacy skills.	5	4	3	2	1
10. Can promote successful participation in the regular educational environment.	5	4	3	2	1

The use of computers and other technology:	**Strongly Agree**	**Somewhat Agree**	**Somewhat Disagree**	**Strongly Disagree**	**Not Sure**
11. Can prepare students for the world of work.	5	4	3	2	1
12. Has provided an alternative means of self-expression.	5	4	3	2	1
13. Has developed receptive language skills in students.	5	4	3	2	1
14. Can be used effectively to meet the needs of students with other disabilities.	5	4	3	2	1

Comments:

Appendix E

Regular Education Student Questionnaire

Listed below are a series of statements. Please indicate whether you agree with each statement by circling either 1 for Yes, 2 for No, or 3 for Not Sure.

	Yes	No	Not Sure
1. The Hyperstudio presentation on jobs/careers was fun and interesting to watch.	1	2	3
2. I learned about jobs that I can do in the future.	1	2	3
3. I am impressed by the Hyperstudio presentation on jobs/careers that these students created.	1	2	3
4. Computers and other technology make learning fun.	1	2	3
5. I would like to use computers and other technology to do more assignments.	1	2	3

	Yes	No	Not Sure
6. I would like to visit job sites in the community to learn more about jobs and careers.	1	2	3

Comments:

Appendix F

Speech and Language Teacher Questionnaire

Listed below are a series of statements. After viewing the Hyperstudio presentation on careers created by the four students in this study, please indicate whether you strongly agree, agree somewhat, disagree somewhat or strongly disagree with each statement. (CIRCLE ONE RESPONSE FOR EACH ITEM)

The use of computers and other technology:	**Strongly Agree**	**Somewhat Agree**	**Somewhat Disagree**	**Strongly Disagree**	**Not Sure**
1. Has facilitated communication.	5	4	3	2	1
2. Has developed problem solving skills.	5	4	3	2	1
3. Has enhanced social interaction with peers and adults.	5	4	3	2	1
4. Has developed self-esteem.	5	4	3	2	1
5. Has developed career awareness.	5	4	3	2	1
6. Has improved independence.	5	4	3	2	1
7. Has addressed learning styles.	5	4	3	2	1
8. Has developed vocabulary.	5	4	3	2	1
9. Has fostered literacy skills.	5	4	3	2	1
10. Can promote successful participation in the regular educational environment.	5	4	3	2	1

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Not Sure
The use of computers and other technology:					
11. Can prepare students for the world of work.	5	4	3	2	1
12. Provided meaningful and appropriate information to students who watched the presentation.	5	4	3	2	1
13. Can be used to develop other curricular areas.	5	4	3	2	1
14. Can be used as an effective method of instruction with all students.	5	4	3	2	1

Comments:

Appendix G

Parent Interview Questions about Technology Use

1. Are you aware of the school work your child has done using a computer and other technology?

2. Did she/he seem to enjoy the projects? Was your child enthusiastic in discussing the projects with you?

3. After viewing the Hyperstudio project, what are your impressions?

4. How did this project make you feel? Did you feel a sense of pride with your child's accomplishments?

5. Do you feel computer use and other technology help your child learn?

6. Do you feel your child has fun while using the computer and other technology?

7. Do you feel computer use and other technology is preparing your son/daughter for the world of work? If yes, how so?

8. Is your child proud of the computer work he/she has accomplished?

Appendix H

Questionnaire and Interview Instrument Review Panel

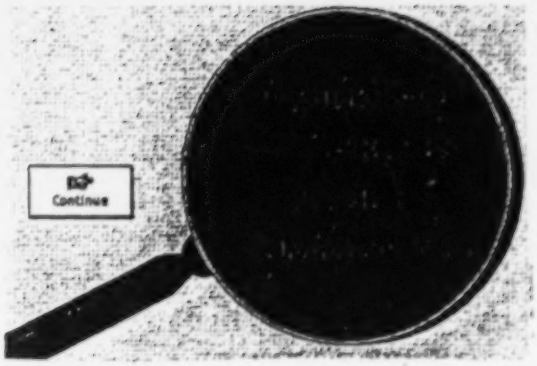
1. Shirley Andres, M.S., School-To-Work Building Liaison for Green Bay Area Public Schools.

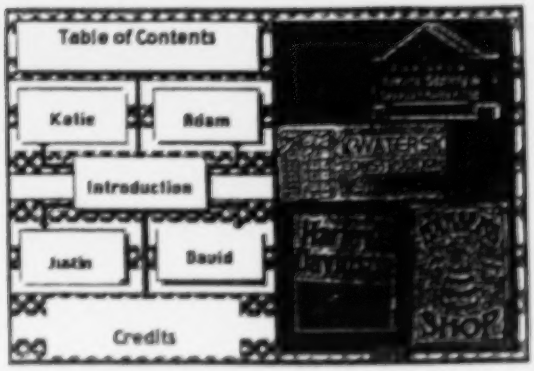
2. Patricia French, M.S., Program Support - Speech/Language & Assistive Technology Committee Co-Chair for Green Bay Area Public Schools.

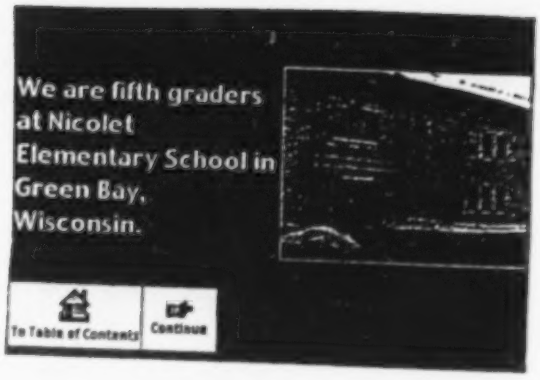
3. Mary Derginer, M.S., Transition Coordinator/Curriculum Liaison for Green Bay Area Public Schools.

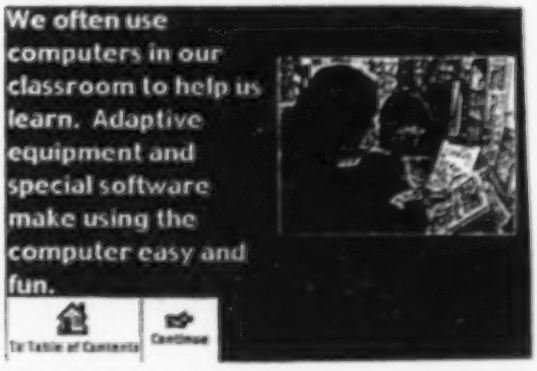
4. Michael Duschene, M.S., Associate Executive Director of Programs for Brown County Association for Retarded Citizens.

Appendix I

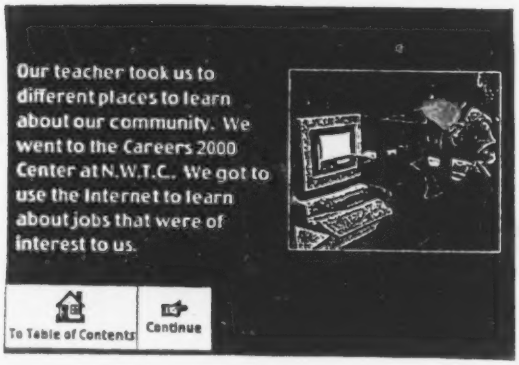


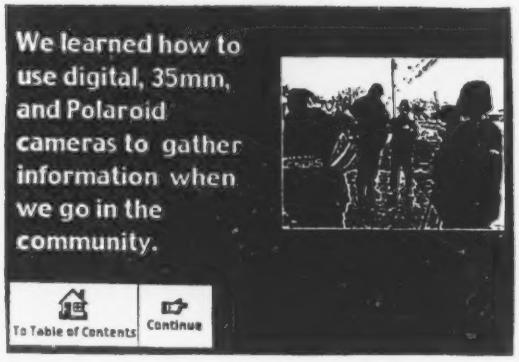


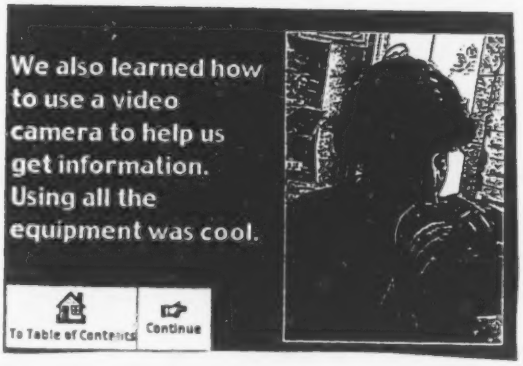


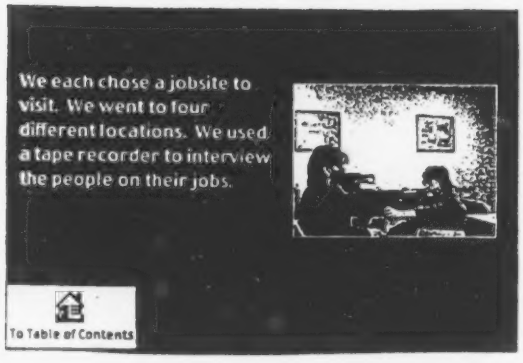

We often use computers in our classroom to help us learn. Adaptive equipment and special software make using the computer easy and fun.

BEST COPY AVAILABLE

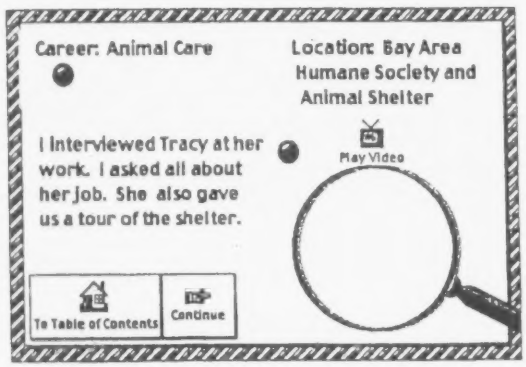

Our teacher took us to different places to learn about our community. We went to the Careers 2000 Center at N.W.T.C. We got to use the Internet to learn about jobs that were of interest to us.
To Table of Contents
Continue

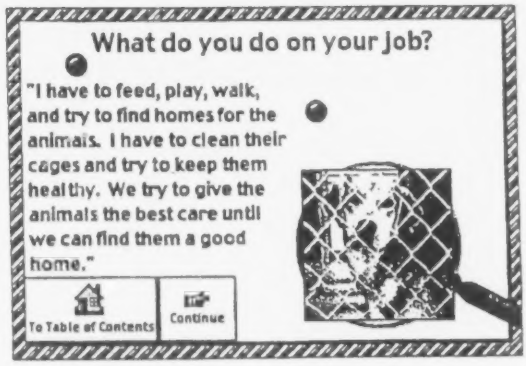

We learned how to use digital, 35mm, and Polaroid cameras to gather information when we go in the community.
To Table of Contents
Continue

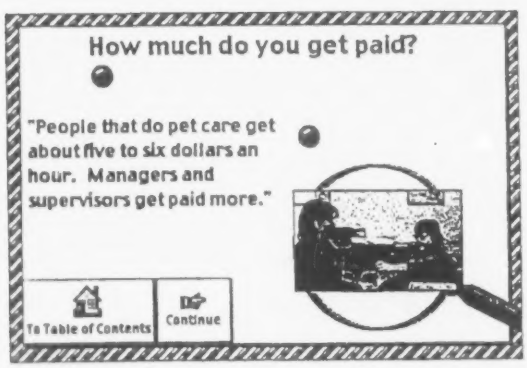

We also learned how to use a video camera to help us get information. Using all the equipment was cool.
To Table of Contents
Continue

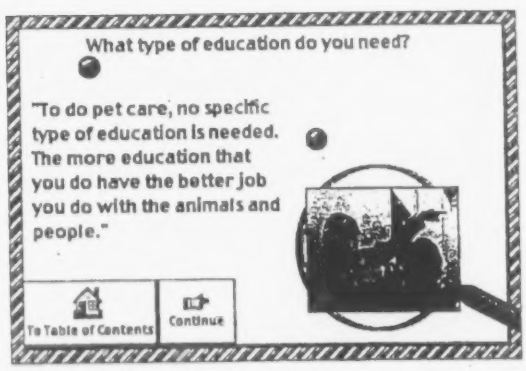

We each chose a jobsite to visit. We went to four different locations. We used a tape recorder to interview the people on their jobs.
To Table of Contents

BEST COPY AVAILABLE

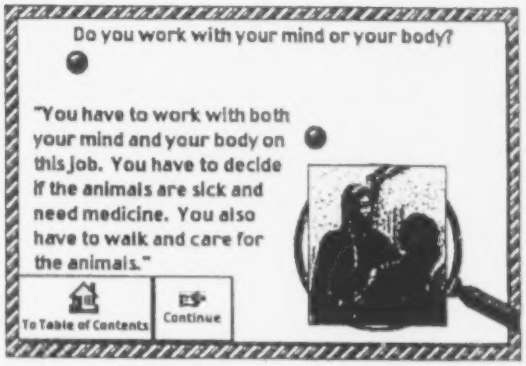

Career: Animal Care
Location: Bay Area Humane Society and Animal Shelter
I interviewed Tracy at her work. I asked all about her job. She also gave us a tour of the shelter.
Play Video
To Table of Contents
Continue

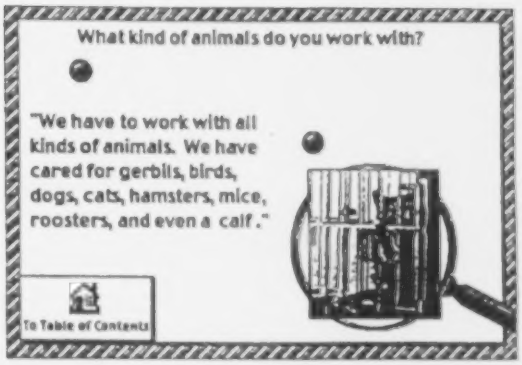

What do you do on your Job?
"I have to feed, play, walk, and try to find homes for the animals. I have to clean their cages and try to keep them healthy. We try to give the animals the best care until we can find them a good home."
To Table of Contents
Continue


How much do you get paid?
"People that do pet care get about five to six dollars an hour. Managers and supervisors get paid more."
To Table of Contents
Continue

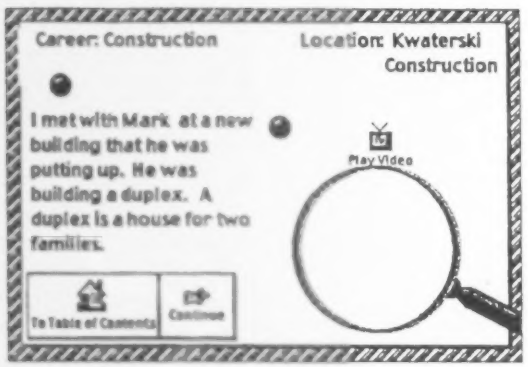

What type of education do you need?
"To do pet care, no specific type of education is needed. The more education that you do have the better job you do with the animals and people."
To Table of Contents
Continue

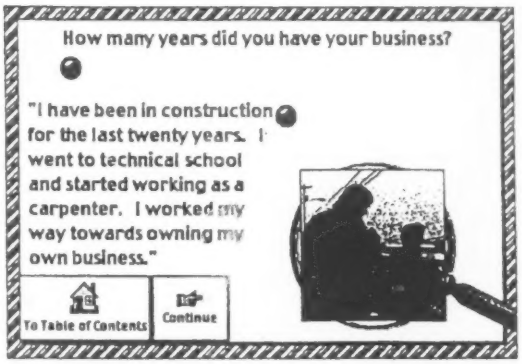
BEST COPY AVAILABLE

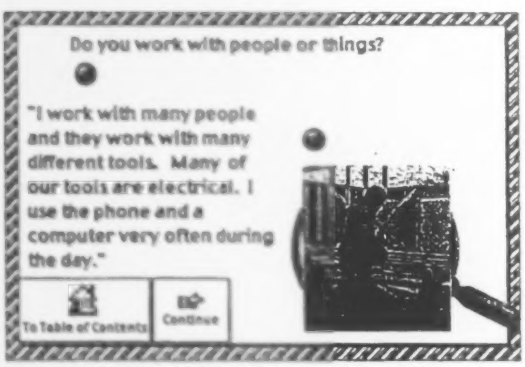

Do you work with your mind or your body?
"You have to work with both your mind and your body on this job. You have to decide if the animals are sick and need medicine. You also have to walk and care for the animals."
To Table of Contents
Continue

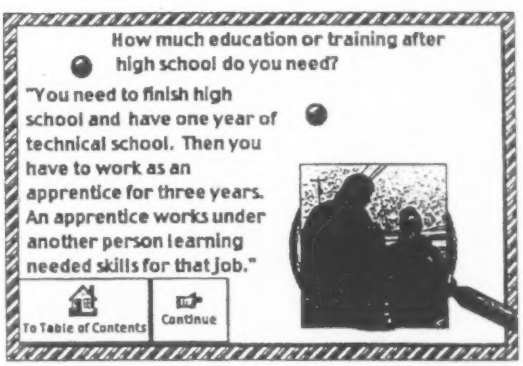

What kind of animals do you work with?
"We have to work with all kinds of animals. We have cared for gerbils, birds, dogs, cats, hamsters, mice, roosters, and even a calf."
To Table of Contents

BEST COPY AVAILABLE

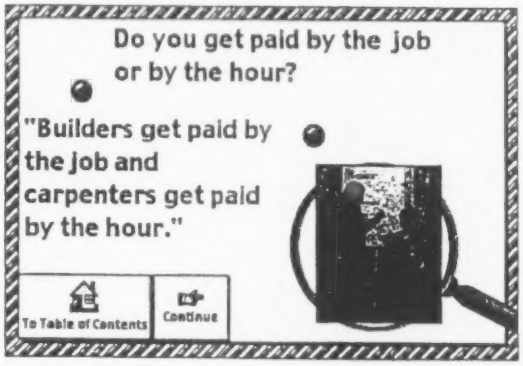

Career: Construction
Location: Kwaterski Construction
I met with Mark at a new building that he was putting up. He was building a duplex. A duplex is a house for two families.
Play Video
To Table of Contents
Continue

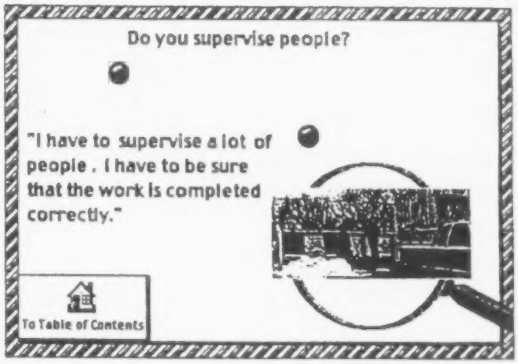

How many years did you have your business?
"I have been in construction for the last twenty years. I went to technical school and started working as a carpenter. I worked my way towards owning my own business."
To Table of Contents
Continue


Do you work with people or things?
"I work with many people and they work with many different tools. Many of our tools are electrical. I use the phone and a computer very often during the day."
To Table of Contents
Continue

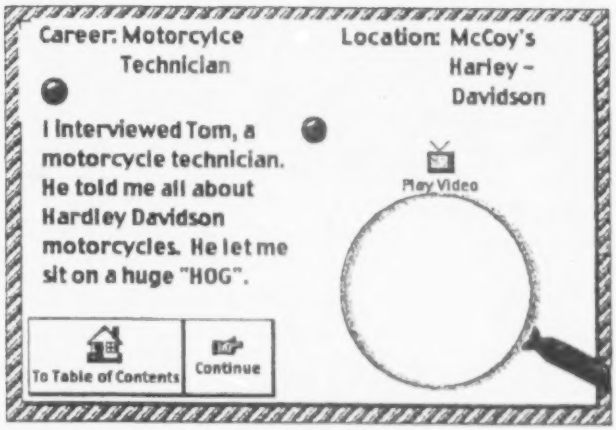

How much education or training after high school do you need?
"You need to finish high school and have one year of technical school. Then you have to work as an apprentice for three years. An apprentice works under another person learning needed skills for that job."
To Table of Contents
Continue

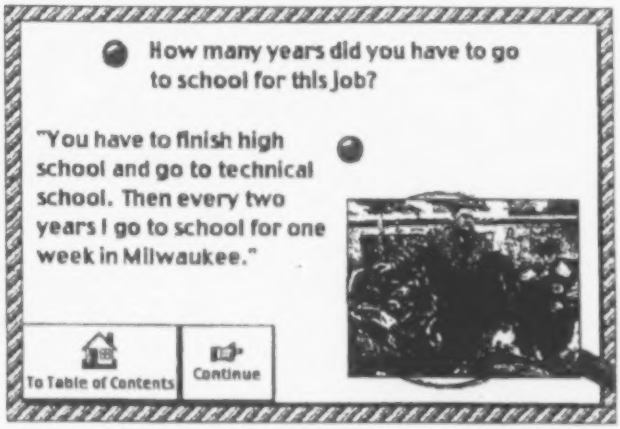
BEST COPY AVAILABLE

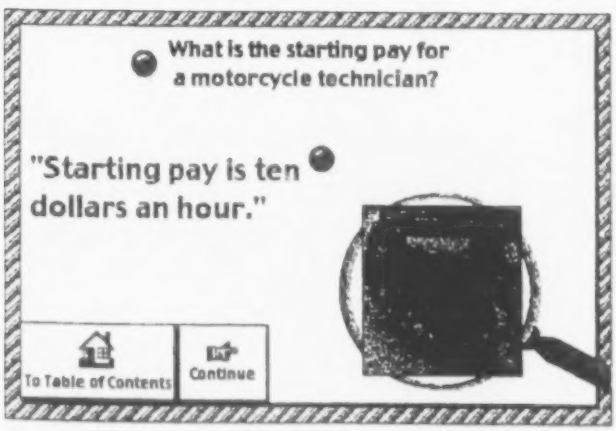

Do you get paid by the job or by the hour?
"Builders get paid by the job and carpenters get paid by the hour."
To Table of Contents
Continue

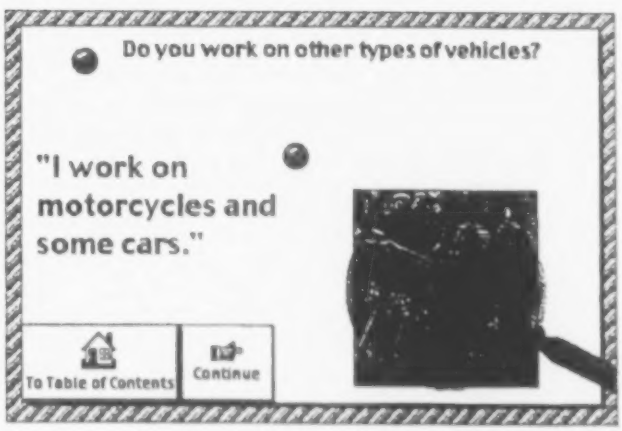

Do you supervise people?
"I have to supervise a lot of people. I have to be sure that the work is completed correctly."
To Table of Contents

BEST COPY AVAILABLE

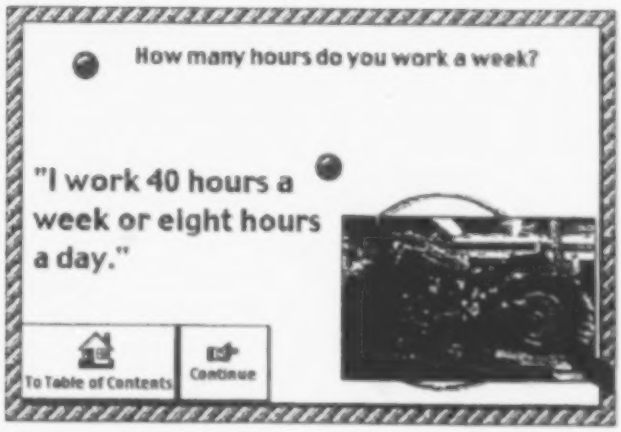

Career: Motorcyice Technician
Location: McCoy's Harley - Davidson
I interviewed Tom, a motorcycle technician. He told me all about Hardley Davidson motorcycles. He let me sit on a huge "HOG".
Play Video
To Table of Contents
Continue

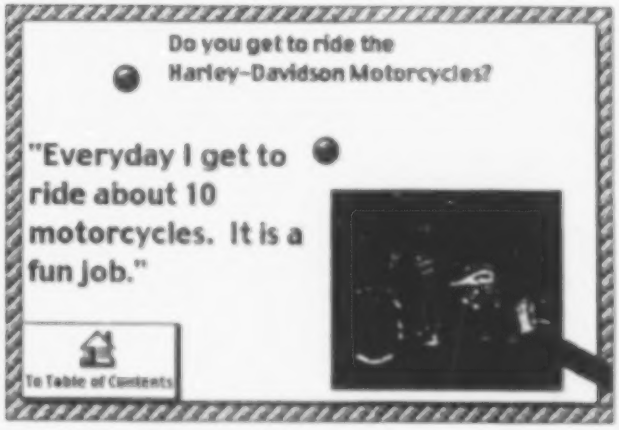

How many years did you have to go to school for this job?
"You have to finish high school and go to technical school. Then every two years I go to school for one week in Milwaukee."
To Table of Contents
Continue



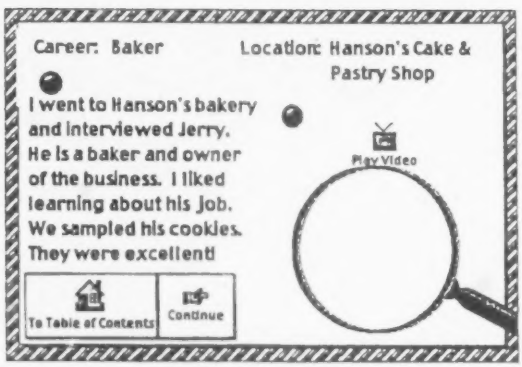


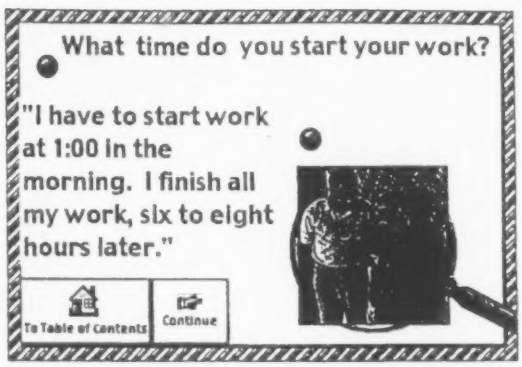
BEST COPY AVAILABLE

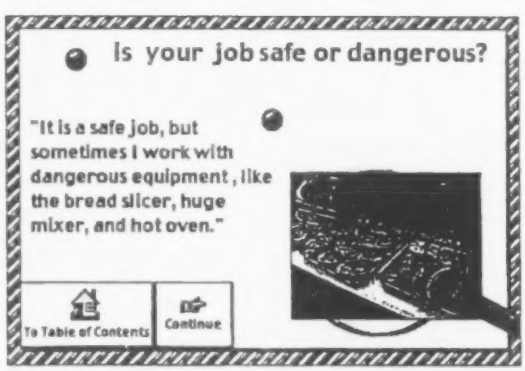


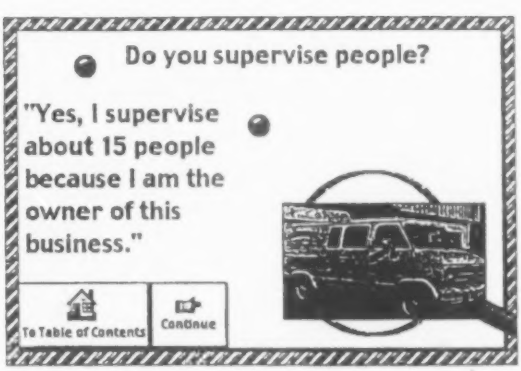

Do you get to ride the Harley-Davidson Motorcycles?
"Everyday I get to ride about 10 motorcycles. It is a fun job."
To Table of Contents

BEST COPY AVAILABLE

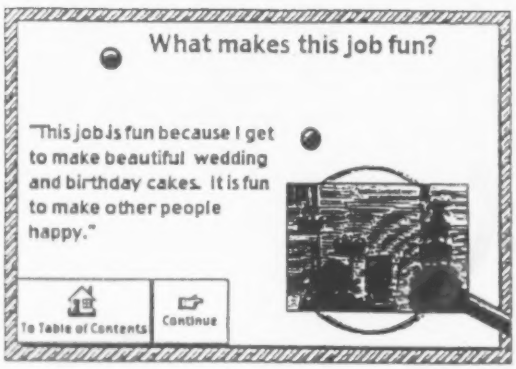

Career: Baker
Location: Hanson's Cake & Pastry Shop
I went to Hanson's bakery and interviewed Jerry. He is a baker and owner of the business. I liked learning about his job. We sampled his cookies. They were excellent!
Play Video
To Table of Contents
Continue

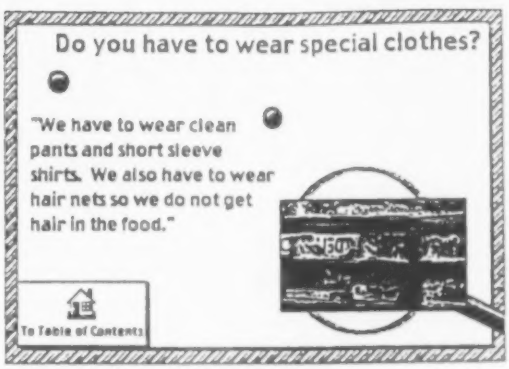

What time do you start your work?
"I have to start work at 1:00 in the morning. I finish all my work, six to eight hours later."
To Table of Contents
Continue

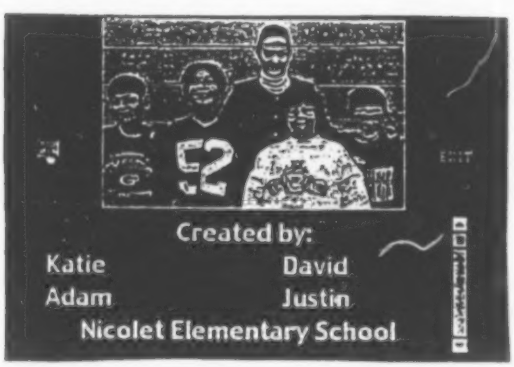

Is your job safe or dangerous?
"It is a safe job, but sometimes I work with dangerous equipment, like the bread slicer, huge mixer, and hot oven."
To Table of Contents
Continue


Do you supervise people?
"Yes, I supervise about 15 people because I am the owner of this business."
To Table of Contents
Continue

BEST COPY AVAILABLE


What makes this job fun?
"This job is fun because I get to make beautiful wedding and birthday cakes. It is fun to make other people happy."
To Table of Contents
Continue


Do you have to wear special clothes?
"We have to wear clean pants and short sleeve shirts. We also have to wear hair nets so we do not get hair in the food."
To Table of Contents



BEST COPY AVAILABLE

Created by:

Katie David

Adam Justin

Nicolet Elementary School

Produced and Edited By:

Ann Duschene

Special Education Teacher &

Masters Degree Candidate

Adaptive Education–

Assistive Technology

St. Norbert College

Special Thanks To:

Careers 2000 at N.W.T.C. –

Lea VanApeldoorn

and

Mark Franks

Bay Area Humane Society and

Animal Shelter –

Tracy Burkel

Kwaterski Construction Inc. –
Mark Kwaterski

Harley-Davidson
Of Green Bay, Inc. –
Tom McCoy

Hanson's Cake & Pastry Shop –
Jerry Polarek

John Philps – Assistive Technology
Specialist, G.B.A.P.S.

Corporate Sponsors:
T N T Pizza Crust
Proctor & Gamble

Sound Track From:
Good Morning, Vietnam –

"What a Wonderful World"
By: Louis Armstrong

THE END

Appendix J

December 3, 1997

Dear _____:

I am doing research as part of my Master's Degree in the Adaptive Education Program with a focus on Assistive Technology through St. Norbert College, DePere, WI. The subject of my thesis is "Teaching functional skills through technology: Using assistive technology and multimedia tools to develop career awareness skills for students with cognitive disabilities".

I am requesting your permission to do my research with Katie. I am hoping to have four, fifth graders in my program participate in this study. Katie will be looking at a career that is of interest to her using Children's Dictionary of Occupations CD-ROM and the Internet to find a career/job that she would like to research and report on. Katie will then develop specific questions using computer software. She will then visit a job site with myself in which this career is found. Katie will interview employees and record information on video and audio tape and with photographs. After obtaining information about the career, Katie will put together a Hyper Studio presentation on all the information she obtained from the Internet, CD-ROM program and from the interviews. Katie will then present her Hyper Studio presentation to her peers within her homeroom. Her peers will be asked to give feedback using a questionnaire. Katie will be given a downloaded copy of her presentation on a video tape.

I see this project as a very active learning assignment that will develop many of Katie's skills. I will be documenting Katie's accomplishments throughout the program. The program will take place at the end of January and throughout the month of February. Katie's first name, photos and videos with her in them will be used in the research.

Please sign below if you give permission for me to do research with Katie. If you have any questions or concerns please contact me at 448-2142.

Sincerely,

Ann Duschene
Special Education Teacher

I hereby give permission for Katie to participate in the research project with Ann Duschene from Nicolet Elementary School, for her Master's Degree thesis entitled, "Teaching Functional Skills Through Technology: Using Assistive Technology and Multimedia Tools to Develop Career Awareness Skills for Students with Cognitive Disabilities".

_____ _____

(Name) (Date)

*Please return by December 5, 1997. Thank you for your support and cooperation.

c.M.W.

November 24, 1997 Appendix K

Mrs. Mary W
Principal
Nicolet School
1390 Elm Street
Green Bay, WI 54302

Dear Mary,

I am pursuing a Master's Degree in Adaptive Education with a focus on Assistive Technology through St. Norbert College, DePere, WI. I am required to do a thesis in partial fulfillment of the requirements for graduation. The topic of my thesis is "teaching functional skills through technology, using assistive technology and multimedia tools to develop career awareness skills of students with cognitive disabilities".

I am requesting your permission to complete my research with Katie , Adam , David , and Justin . Briefly, these students will be exploring careers of their interest using Children's Dictionary of Occupations CD-ROM and the Internet to find a career/job that they would like to research and report on. These student will then develop specific questions using computer software. Students will then visit four job sites in which these careers are found. Students will interview employees and record information on video and audio tape and with photographs. After obtaining information on their career, students will put together a Hyper Studio presentation on all the information they obtained from the Internet, CD-ROM program and from the interviews. Students will then present their group Hyper Studio presentation to their peers within their homeroom. Their peers will be asked to give feedback using a Rubric scale questionnaire. Students will be given a downloaded copy of their presentation on a video tape.

I see this project as an very active learning assignment that will develop many skills for the students involved. I will be documenting student accomplishments throughout the study. The study will take place at the end of January and throughout the month of February. Please sign on the next page if permission to conduct research with the four students listed above is granted. Attached is a copy of one parent permission slip. Any consideration in my behalf in appreciated.

I give permission to Ann Duschene to conduct research for her Master's Degree thesis entitled "Teaching Functional Skills Through Technology: Using Assistive Technology and Multimedia Tools to Develop Career Awareness for Students with Cognitive Disabilities". The four fifth grade students named in this letter will be the sample in the study.

_____ _____

(Mary) (Date)

Any consideration in my behalf in appreciated.

Sincerely,

Ann Duschene